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1,000 combinations of voltage and current are available through the Hobart Multi-Range Dual Control making it possible to adjust volt-ampere relationship to any required degree—and with Hobart's exclusive Remote Control that lets you make adjustments at the work. there can be no question of quality. Hobart welders are now available for your important work. Ask us for delivery dates.

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There is an army of unskilled operators ready to cut perfect threads with the Rivett Thread Tool. Not new, but proven, this tool helped win the last war and is again ready to throw its weight into Victory Production.

The Rivett Thread Tool is an attachment for any screw cutting engine lathe, and takes the place of single point thread tools commonly used. The tool is a holder for a ten tooth cutter with means for indexing the cutter to present each of the ten teeth progressively to the work. The first nine teeth rough out the thread in nine heavy, measured cuts, the tenth tooth finishes the thread. The responsibility of the operator is reduced to indexing the cutter when reversing the lathe. The thread tool does the rest.

Descriptive bulletin and ordering instructions are available on request.

After Cut No. 1

After Cut No. 10

IVETT

LATHE & GRINDER BRIGHTON-BOSTON-MASS



CAPACITY: 1/16" to 1" with collets 1" to 6" with step chucks 1" to 5" with jaw chucks Spindle Speeds 100 to 4000 r.p.m

The combination of extreme accuracy, high spindle speeds and ease of operation means better results under the close tolerances of manufacturing standards both today and in the days to come. The ease and simplicity of operation enables relatively unskilled operators to produce parts to the necessary close limits without expensive tooling

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

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Machine Tool Blue Book

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These advanced design tapping machines offer you many definite advantages. For instance, the unit here illustrated handles from No. 2 tap up to 5/16" in steel, 3%" in cast iron, ½" in brass or aluminum — by interchanging two tapping heads. During rapidly changing production conditions, this flexibility is extremely important. Other Procunier advantages include: 1. The important of the procunier tapping head with double-cone cork-face friction clutch and other exclusive features; 2. Four speeds, ranging from 390 to 2050 RPM, efficiently handle jobs for which conventional high speed tapping machines are inadequate; 3. Extra long Spiral Compensating Springs conveniently

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For Faster, More Accurate Tappin

THE PROCUNIER SAFETY CHUCK CO., 14 S. Clinton St., Chicago

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Tru-Grip Tap Holders.

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IN the answer to this extraordinary question is a curious story. For two scientists once posed that very question to themselves . . . and the answer was Yes!

They actually built a machine with the power to "learn" by experience and "remember" what it had learned-a mechanism capable of simulating the rudimentary behavior of a rat Comprised of solenoids, gears and relays, it traveled a grooved track forked by 12 dead-end side-tracks-equivalent to the blind alleys which a living rat encounters. Set to take the deadend forks, as if by an inner compulsion, this robot rat literally learned by experience to avoid the frustrating blind alleys, in a perfect mechanical analogue to the conditioned reflexes of the brain."

To build a machine that would reproduce all the behavior of a rat "would require a mechanism probably as large as the Capitol at Washington"-but it could be done!

For we're at the beginning of an amazing new technological age. Already there are many kinds of thinking machines in our incredibly mechanized world, helping to speed production, cut costs and build better products. And intimately a part of this whole story is the science of machine tool engineering. Today, Jones & Lamson engineers are working with the leading manufacturers in virtually every industry, helping them

to plan production wew for the machines and the products of tomorrow.

They are at your service, too.

* In "The Advancing Front of Science" by George W. Gray, a memorable chapter on thinking machines reports the stary in full



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Manufacturers of: Universal Turret Lathes . Fay Astr Lathes + Automatic Double-End Milling and Contaring Machines . Automotic Thread Grinders . Optical Compa tors . Automotic Opening Threading Dies and Chasers.

Jack
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Post War Methods
folder CMP

TRACER CONT

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LIE CINCINNATE MILLING MACHINE CO

ROLLED HYDROMATIC Mills Uphill and Down and On the Level, Too

The Tracer Controlled group of Hydromatics, an offspring of the family of standard CINCINNATI Hydromatics, offers new possibilities in production milling which may be applied now in retooling for more economical production. And today's application of the tracer method of milling will suggest better machining methods when your war contracts terminate; when you must find a way to produce new things that will provide needed jobs.

Basically, Tracer Controlled Hydromatics accurately mill uphill and down, within the angle of inclination indicated in Figure 1. The longitudinal table feed and the vertical feed of the spindle carrier are actuated hydraulically and synchronized through a tracer valve mechanism which contacts a master template attached to the fixture. The profiles to be milled may be straight lines or curves, or a combination of the two. Even a box shaped profile can be handled in two operations. Three possibilities are sketched at the right.

If you are faced with design changes or increased production schedules, perhaps the Tracer Controlled Hydromatics can be applied to meet the new requirements more quickly. Most certainly they deserve consideration in your post war methods planning. In either case, our engineers will be glad to assist with your plans.



Streamline The Surfaces Superfinish

LAMBERT MODEL 340 SUPERFINISHER

The Model 340 is a production machine for small parts. Any lathe tool, milling cutter, reamer, or any other tool that can be ground on a tool and cutter grinder, can be SUPERFINISHED on this machine.

NOW YOUR LATHE — A SUPERFINISHER

A lathe attachment, complete with variable speed, a complete lubricant system including tank, pump and filtration system is now available. Either internal or external SUPERFINISHING heads can be furnished.

LAMBERT MODEL 325 SUPERFINISHER

LAMBERT SUPERFINISHERS are built in three sizes. The Model 325 has a swing over the bed of 14" and 1114" over the carriage with 46" or 62" between centers. It is a completely universal machine for external and internal rounds, tapers, and flats.



MODEL 340 FOR SMALL PARTS



MODEL 350 LATHE ATTACHMENT



OHIO UNITS - Licensed Manufacturers - Dayton 4, Ohio



In only four short years, the American machine tool industry has built more tools than were produced in the previous forty. They're better tools, faster, more accurate, easier to operate.

Today, they're all working in essential war industries. They're winning the battle of machines against machines. You may be confident that they're helping America create an irresistible striking power that our enemies will never match.

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1185 East Washington Avenue . Madison, Wisconsin

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With Gisholt Improvements in Metal Turning

TEE GISBOLT AUTOMATIC BYBRAULIC LATEE requires too little attention that one man (or woman) can tend two or three machines. Easy tool set-up and adaptability to handle a variety of work, make it practical to use its high machining speeds even in small lot production.

TURRET LATHES . AUTOMATIC LATHES . BALANCING MACHINES

Helpful tips which will increase the capacity of your G. & L. Boring Machine

Use Equipment Like This to Reduce Set-up Time-Handle More Jobs

Leading, locating, setting and receiting of the workpless often communications of the fines-so-floor time of a part machined on a horizontal boring machine. Obviously, then, any stackment or accessory that can be used to reduce this date pays for itself quickly. Our segiment have developed several types of attachments and accessories which may bely so save those time and produce more work on your bestments being machines.



Rotary Tables

Rotary tables permit the machining of various surfaces without resetting the part. For instance, four or more sides of a workpiece can be machined by merely indexing the table to present the face to be machined to the machine spindle. G. & L. Rotary Tables are available from the simple, plain 24-inch diameter rotary table with 1/8° graduations up to the largest completely selfcontained units weighing 55,000 lbs., with a rated capacity for parts weighing up to 25 tons.



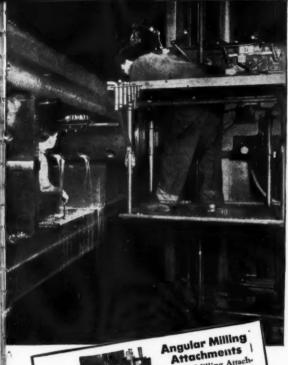
Universal Tilting and Rotary Tables

These units are primarily intend. Theseunitaare primarily intendd for use in connection with
d for use in connection. The
floor-type machines.
The table
floor type machines and can
play be rotated 360° and can
play the control of the
floor the horizontal to the verfrom the horizontal to the verfrom the horizontal to the
floors and the horizon and drilling
floors and the horizon and drilling faces and the boring and drilling taces and the boring and drilling so foles at various angles is greatly facilitated. This table is approximately at high and graduated in degrees and half





GIDDINGS & LEWIS



Angular Milling Attach ments, like Rotary Tables, are used to minimize the number of setmize of the workpiece.

mize the number of seltings of the workpiece.

They are usually furnished so that the head of the attachment is adjustable through 56° and In some cases, side and

clamped to any desired angle. In some cases, side and interest and milling attachments are recommended. These one of two spindles operating at right angles to each other. Special angular attachments to suit your specific work can be designed and furnished.



Continuous Feed Facing and Boring Head

This outstanding attachment permits facing and boring operations simultaneously and many other combinations of operations not ordinarily performed with the horizontal boring drilling and milling machine. It is provided with a tool slide having six separate continuous power feeds.



(Above) G. & L. 340 RT Machine with built-in rotary table.

Combinations of Attachments and Accessories

Oftentimes, combinations of various attachments and accessories can be used to advantage in reducing set-up time and increasing production. G. & L. field engineers will be glad to work with you in making proper selections.

Write for Additional Data

The book covers the complete line of G. S. L. Hane-sering machines and accessories. Weits for your copy today, Please indicate year lands of the parties of the complete control of the Builtein No. BB14.

MACHINE TOOL COMPANY

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3 ALLISON CHUCKS

MODEL No. 1

MODEL No. 1 for 11, 8-thread spindle lather - with 2, collet capacity - is unsurpassed as a combination thick for either first or second operation work.

MODEL No. 2 for 11/2" 8-thread spindle tathes — with "2" sallet capacity — full circular low pressure cam activates the callet clasing mechanism, thus giving any desired gripping pressure.

MODEL No. 3 For 21/2" spindles and under — with 15/4" collet capacity — has same mechanical advantages as the 52 chuck.

All Allison Collet Chuck closing handles oper-

MODEL No. 2

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MODEL No. 3

Allison

TOOL AND ENGINEERING CO.

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SHAFT MACHINES

GROUND

ROTARY FILES

QUICK CHANGE CHUCKS

AND COLLETS

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MIDDLETOWN, - CONN.

in a Cylindrical Li GRINDERGRAM Never force a grinding wheel onto its sleeve. It should slide onto the sleeve freely and yet without undue looseness.

yes-THE NORTON SIMPLEX has adaptability

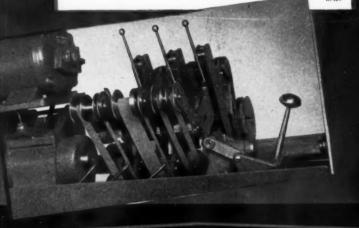
MAGINE changing over a lapper from one job to another in a few minutes? It can be done with the new NORTON SIMPLEX LAPPER.

Here is a production machine reduced to its simplest form, yell a machine which will produce finishes of from five to one micro-inches R.M.S. on cylindrical surfaces.

It is particularly adapted to work on small trunions, journals, sleeves, bearings between shoulders, and other similar cylindrical surfaces. One, two, three, four, five, six and more surfaces may be finished simultaneously. In addition, short throw cranks and eccentrics are well within the range of the NORTON SIMPLEX. Timer cycle control and table reciprocation give fast, positive precision production in a machine built to Norton standards of craftsmanship.

NORTON COMPANY, Worcester 6, Mass.

M-48



NORTON

GRINDERS

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Machine

...handle a
wide range of
CONVENTIONAL WORK
and
SPECIAL
APPLICATIONS

• If your work calls for accurate centering of one or both ends prior to other machining—if it is within ½" to 6" in diameter and up to 96" in length—it can be handled to advantage on Sundstrand Centering and Drilling Machines.

In work requiring only centering of simple parts, these machines offer ease and speed of handling, reduced production costs, and compact, space-saving

construction.

The No. 56 Centering Machine can be used on work from ½" to 6" in diameter. Two 1" drills or under can be used simultaneously in steel. The machine is made in four sizes—6" x 24", 6" x 48".

6" x 72" and 6" x 96".

Send us a print of the job—specify the diameter and length of the workpiece. At no obligation, our engineers will determine what can be done, tooling methods available and the investment required.

If not too complicated, special applications such as combined operations or machining of odd-shaped parts can also be handled by means of attachments and fixtures.

The capacities of the two machines are as follows:

The No. 53 Centering Machine will handle round or hexagonal stock from ½" to 4" in diameter. Two drills ½" or under can be used simultaneously in steel. The machine is made in two sizes—4" x 24" and 4" x 28".



(Right) No. 56

Machine

Free Additional Data is included in these two booklets. Write today for your copies—ask for Bulletins No. 53-1 and 56-1.

SUNDSTRAND MACHINE TOOL CO.

2535 ELEVENTH ST., ROCKFORD, ILLINOIS, U.S.A.



DOUGLAS Precision MACHINES



The Douglas Miller combines rigid, well balanced design with convenience of control making it particularly suitable for accurate work in tool room as well as to general production.

Showing operation with Universal Milling attachment on tool room job producing a production fixture.





Showing operation with four cutters machining alloy steel for high precision aircraft parts.

> Prompt Delivery to War Plants

FOR TOOL ROOM AND PRODUCTION

The Rotorex Universal Tool and Cutter Grinder will accurately perform all kinds of tool grinding operations. Readily interchangeable attachments are available to set up machine for single-purpose jobs such as evilindrical, internal and radius grinding.

Operation showing set-up for winternal grinding.





Operation showing set-up for sharpening straight gash hobs.



DOUGLAS MACHINERY CO., Inc.

TEO DEON BULLY

NEW YORK N.

"BUILT-IN" Low Cost Drilling .. with This Tool

Buffalo builds a large line of drilling machines, hence has available the RIGHT machine for almost any drilling job. The No. 16 shown here is an "extra-service" tool built to deliver a maximum number of holes without maintenance expense or continuous adjustment. Speed range is from 400 rpm suitable for %" drill in cast iron, up to 3,000 rpm for \%" or smaller drills. (If lower speeds are required we can furnish practically any speed desired.

The No. 16 Drill is built in 3 sizes: 16", 24" and 30" swing, each of which is available in bench and pedestal type. A round column floor type is made in 16" swing only. All bench and pedestal models can be had in one to six-spindle units.

There is much more about the No. 16 in Bulletin 2730.

- FEATURES
- Coolant System · Power Feed
- Moderate Cost
- Numerous Combinations
- Good Delivery For the shop with special requirements, the No.

Is can be snow with special requirements, the No. 18 can be factory-engineered to suit any operation. With many special parts available and broad experience in applying tooling, Buffale engineers can probably make substantial savings on your drilling costs.

Write today for copy of Bulletin No. 2730, which illustrates the complete No. 16 line.

BUFFALO FORGE COMPANY



161 Mortimer St., Buffale, N. Y. CANADIAN BLOWER & FORGE CO.

Kitchener, Ontario

SENSITIVE AND POWER FEED





The world's largest magnesium sheet and strip mill has recently gone into production.

Systhetic sapphires and rubies for the jeweled bearings of instruments and for spray nozzles, gages and spinnerets cost from three to six cents per carat while diamonds for this purpose cost about three dollars per carat. The making of these is an American war baby with a future.

NE alloys now make up as much as 20% of the tonnage of steel for aircraft.

A way has been found to put the "flags" (characteristic of natural bristles) on the ends of synthetic bristles for use in paint brushes.

The American chemical industry promises that it will employ more workers after the war than it did before.

Bituminous Coal Research, Inc., supported by the industry, has announced a. \$2,500,000 program, covering five years, with improvement in the use of soft coal as its object.

Dip-painted parts are being passed through an electrical field which removes the "tear-drop" in which the excess paint collects.

Electronic traffic control may replace the familiar signs and lights by signalling the driver through his dash radio.

The strongest natural fiber is Ramie, cultivated in Egypt 4,000 years ago. It is now being grown in this country and, if practical processing methods can be devised, it is expected to appear among our new textiles.

The new Orthicon camera has an "eye" composed of 400,000 pieces of light-sensitive silver which store voltage proportional to the light cast on them. It will be used in television and is said to be ten times as efficient as the iconoscope previously used.

Photo-electric cells check hand grenades at the rate of 4,000 per hour. When a defective unit appears on the conveyor, the mechanism rings a bell, lights a lamp, puts a dab of paint on the grenade, and makes a mark on a chart.

A new process for drying the paint on army tanks does the work in four minutes while the operator drives the tank through the "oven."

The use of the thyratron tube as a rectifier makes possible the use of an A. C. current supply to drive D. C. motors, the advantage being in very exact control of speed,

Extremes of temperatures encountered in flying have made necessary the development of new and better cements to replace the Canada balsam formerly used in the making of lenses. The cost of Diesel-produced electric power is expected to be cut in half as the result of war-time developments.

Street cars designed for post-war production will be lighter, quieter, better looking, and more economical in operation. They will have more comfortable seats and the windows will be higher to give strap hangers a better view.

A new fluorescent lamp, about the size of a marble, uses only two cents worth of current a year.

A new electronic method of sorting metals detects differences in material, alloys, heat treatment and thickness.

Success of the "bazooka" against enemy tanks has called public attention again to the rocket or reaction engine as a source of power. Such a motor has been constructed, for experimental use, that develops 260 horsepower for each pound of its weight. One horsepower per pound is the approximate output of the lightest internal combustion engines.



BESLY GRINDERS





To speed the accurate grinding of parallel surfaces on small parts such as thrust washers, oil seals, sides of bearing races, piston rings, etc.

THE SOLUTION ..

Besly No. 926 Grinder

The 926 Besly Vertical Double Spindle Grinder is used as the finish grinder for parts that have been previously rough ground on standard double spindle grinders.



Send for this Booklet on Besly Titan Steelbac Discs — uniform, easy to mount, they speed output.



Charles H. Besly
and Company was
awarded the Army-Navy "E" on December 1, 1943. More than '/3 of the holders
of the coveted "E" are Besly customers.

RESULTS • • 6 1/8" x 3/32" aircraft engine piston rings were finished to within .0002" for size and parallelism. Light test for flatness, perfect—at rate of 140 passes per minute. Six to eight Micro Inch Finish produced with help of Grain No. 120 Besly Titan Abrasive Members.

BESLY

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Do it Better!...ona LYDRATROL LATHE





"We found 4 different
machining jobs that we could
do better on a
Large Hollow Spindle Type
of Hydratrol Lathe!"

PHROUGHOUT THE WAR — in hundreds of plants
— under all sorts of conditions — LEHMANN HYDRATROL LATHES have invariably brought about
faster production, better work, lower costs.

Look around your own shop — you may find a number of machining jobs which possibly could be done better on a Large Hollow Spindle Type of HYDRATROL LATHE. Send us prints of these unusual, difficult, or too-costly machining jobs, for a specific, time-and-money-saving recommendation.

Five Sizes-18" to 36"

(Standard type lathes, 16" to 36")

Lehmann MACHINE COMPANY

CHOUTFAU AT GRAND + SAINT LOUIS (3) MISSOURI



70% COST REDUCTION

THE DAY IS COMING closer when "How much does it cost?" will be a more important question than "When can you deliver?"

The new Acme-Gridley Multiple Spindle Chucking Automatics are built to produce metal parts at lower costs than industry has yet

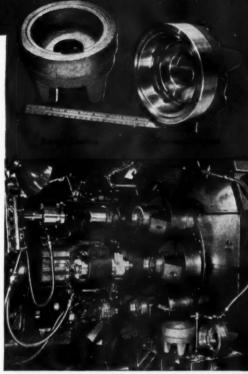
Take for example the part shown here. Two Acme-Gridley six spindle chuckers replaced 20 machines in finishing this part and cut the machining costs per piece more than 70%!

Production costs like these will be the basis for the new low selling prices certain to be necessary in the highly-competitive markets ahead of us.

If you have chucking jobs to do, be sure to read new

bulletin CM-43.

Acme-Gridley Automatics-4, 6 and 8 spindle-Bar and Chucking give you precision work at speeds and feeds as fast as modern cutting tools can stand.



This 12" RPA six spindle Acme-Gridley Chucker is tooled for 18 separate operations. Job finished in 1/5 the time required by former machining methods—saving equipment, tooling time, power and floor space.

ACME-GRIOLEY 4-5 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS - SINGLE SPINDLE AUTOMATICS - AUTOMATIC THREADING DIES AND TAPS - THE CHRONOLOG - LIMIT AND CONTROL STATION SWITCHES - SOLENDIDS - CENTRIFUGES - CONTRACT MANUFACTURING

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New "highs" in production, new "lows" in unit cost start the day you change from solid rivets to tubular or split rivets and Chicago Automatic Rivet Setters. Chicago Riveting is fully automatic . . . the rivet is fed, inserted and clinched with each trip of the foot pedal.

Have Chicago Rivet engineers analyze your rivet cost reduction possibilities now. Send us loose samples of your assemblies . . . we return them fully riveted, with accurately estimated riveting time schedules. When Army and Navy men see how much faster and better Chicago Riveting is, their usual advice is "Change now to Chicago Automatic Riveting."

Typical Chicago Automatic Rivet Setter. Other models available for setting up to 4 rivets at a time...bench or pedal types.

Chicago Rivet & MACHINE CO.

9600 W. JACKSON BLVD., BELLWOOD, ILL., (Chicago Suburb)
TUBULAR AND SPLIT RIVETS IN ALL RIVET METALS

NUCUT TWO-FILE FILING HELPS STEP UP WARTIME PRODUCTION



SPECIFY PRECISION LATHE ATTACHMENTS

IMMEDIATE DELIVERY FROM STOCK

For 10" Atlas & Logan, 9" South Bend 1/2" Capacity Lathes, etc.





Order from your dealer or write us for literature.



BREN Collet \$4.50 ea.

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Precision
BREN COLLET

HAND DRAWBAR \$18.50



- Increases 1/2" collet capacity lathes to 3/4".
- Ready for instant use and interchangeable on any 1½" x 8 thread spindle lathe . . .
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- · Full Spindle Accuracy.
- LEYER TYPE for continuous production.
 Feather pressure releases work while lather is running. LIST \$79.50, Collet extra.
- HAND TYPE for use where quantity production is not required. Lathe must be stopped to open and close collet. LIST \$19.75, Collet extra.



PRECISION COLLET DIVISION

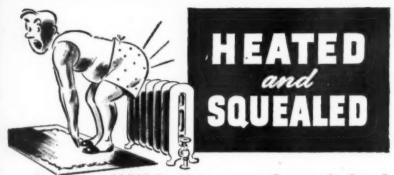
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To assist you in getting all the benefits of modern planer science and practice, Liberty offers the helpful cooperation of its trained engineers. With a background of thorough experience with all types of machine tool equipment and operations, Liberty engineers can help you get greater production faster, more accurately, automatically—at lower cost. Ask for Bulletin 152, no obligation.

LIBERTY OPEN SIDE PLANERS

LIBERTY PLANERS . HAMILTON, OHIO . U. S. A.



One-Third of the Grinding Time was Saved ... without Heating

Another War Production Test Run shows Cortland Chucks and Segments producing more at lower cost.

TEST FACTS: A large manufacturer of bearings... using a Blanchard No. 18 Vertical Surface Grinder... Wheel Speed 875 R.P.M.

WORK: Bearings—S.A.E. 52100 Steel hardened to 64 Rockwell C scale; 2.82 sq. in. surface ground per piece; 31 pieces per table load.

Detail	CORTLAND Chuck and Segments	Competitive Brand Formerly Used
Cubic inches of stock removed per inch in height of segments	350.0	87.5
Ampere readings	30	15
Dressings necessary	1	1
Work heat?	Cut cool with no noise	Heated work and squealed badly
Grinding time .	112 sec.	180 sec.

Heavier feed could be used and better finish obtained with Cortland Diagonal Shearing Segments.

Why not find out just how Cortland Chucks and Segments can increase the quality and quantity of your grinding output? Write for our latest illustrated bulletin giving the complete Cortland performance story.

CORTLAND GRINDING WHEELS CORP. 9 Cortland Street Chester, Massachusetts

Diagonal Shearing with Varying Contact Means Better Surface Grinding

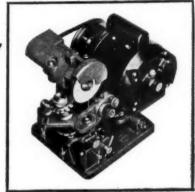


A true segment, the grinding surface has narrow ends that start the work with minimum shock and resistance. Straight inner edge of segment passes diagonally across work with a shearing action that cuts and removes the metal. Varying contact area insures longer exposure to coolant—decreases heat — reduces segment wear — conserves power.

CORTLAND
Chucks and Segments

ANNOUNCING THE NEW

CUTTER SHARPENER



Available with index plates or pawl locating attachment

The new Waltham Cutter Sharpener is designed to keep cutters in production — to make sharpening a fast, accurate operation — to do this easily and economically even with inexperienced labor.

This machine can be used for sharpening cutters such as those used for gear cutting and thread milling, circular form tools, straight fluted hobs, and multiple cutters. These may be sharpened radially or with any desired rake angle. Maximum capacity is 2'' diameter and 36'' thick.

The standard machine is designed to use an index plate for each cutter size. A pawl locating attachment can be furnished for locating on the top relieved portion, or the back of the teeth if desired.

The Waltham Cutter Sharpener is complete — put it on any handy bench — plug into a 110-volt line — it's ready to go, and ready to sharpen cutters for maximum efficiency. Complete information will be found in a new, illustrated catalog — send coupon for your free copy today!

COUPON

Please send me new folder giving full details on the Waltham Cutter Sharpener.

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BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—L & D HIGH SPEED DRILL PRESSES—WALTHAM CUTTER SHARPENERS

"TISSUE-THIN" SPINDLE OILS

Clearances in spindle bearings, low in the fourth decimal place, have created a real lubrication problem. No untreated oil will solve it permanently.

But give a good oil that extra film strength that enables less oil to do more work and stand up under high speeds—and you will have efficient lubrication. Wear will be less; temperatures will go down; speeds up. Kensington Spindle Oils have that quality. Their merits, listed below, enable them to meet more needs with less grades, and to provide maximum efficiency for all types of grinders, drills and tools.

For the full story and data on maintenance of spindle bearings, write for the new KSO booklet. E. F. HOUGHTON & CO., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Merits of Fortified

KENSINGTON SPINDLE OILS

High Film Strength—twice that of similar oils untreated. Spindle wear is reduced because the oil is fortified to carry heavier loads in close clearances.

High Viscosity Index—a natural property of the petroleum stock used, and not artificially attained.

Stability—Oxidation-resistant.... No harmful acids developed which would corrode or etch bearings. No sticking of spindles. Minimum tendency to sludge,

High Degree of Oiliness—Chemical treatment provides lubricity as well as film strength. Power consumption reduced, due to lower friction.

Wide Range of Adaptability—One grade will handle more jobs, thus decreasing inventories and danger of misapplication.

RIGHT

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And make it a RULE to consult WINTER ENGINEERS for the right answers for meeting tapping schedules on time.

The RIGHT Tap for the job is important! The RIGHT lubrication! Speed of operation! Properly designed cutting edges! WINTER ENGINEERS can give you the correct answers to these and many other questions; often saving hours of operating time, and increasing tap life. WINTER TAPS are good tops. Handled with care, and kept sharp they will be cutting good threads long after you would normally expect to discard them.

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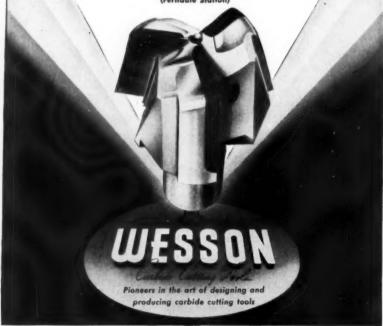


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The greatest contribution to metalworking progress . . . machining metals at woodworking speeds and feeds . . . now possible with WESSON Carbide Cutting Tools. Speeds of 20,000 surface feet per minute, feeds of 360 inches per minute, now attained in hard, tough "light metals". And alloy steel is being face-milled by new design carbide milling cutters, having negative rake and helix angles, at a speed of 3500 surface feet per minute, and a feed of 30 inches per minute . . . with greater precision and finer finishes.

"The Carbide Age" in cutting tools offers new opportunities for greater production at lower costs for those who retool with Carbides and WESSON can NOW assure you prior ratings against the demand to come. Write, wire, or phone.

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No other cetting material or metal.removing technique in the history of manufacturing, has produced such a revolution as have carbide cutting tools. WESSON Carbides produce "high polish" finishes that often climi, nasse farther machining . . . savure greater precision . . . longer tool.life...less frequent re-grinding...greater speed...lower costs... and thereby, competitive advantages. Priorities on future deliveries of WESSON Carbide Tools can be established by planning your retooling program now



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Ideal for drilling, nut-setting, screwdriving, grinding and countless other small tool jobs. Unbeatable for rugged ... dependable ... stall-proof operation. Write for your catalog today. The Aro



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METAL CUT-OFF MA NIMES—Ball bearing iding ram travels 15°. Cuts all types

Not a pound, not a horsepower "loafs" in a Walker-Turner Machine Tool. Thoughtful design and careful selection of materials have made them flexible, versatile and stream-lined-yet rugged and accurate. And most of them operate on minimum horsepower requirements.

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DRILL PRESSES - HAND AND POWER FEED . RADIAL DRILLS METAL-CUTTING BAND SAWS . POLISHING LATHES . FLEXIBLE SHAFT MACHINES RADIAL CUT-OFF MACHINES FOR METAL . MOTORS . BELT & DISC SURFACERS



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It's a real toughie—stands up under severe tests on all kinds of materials. One test that will interest owners of cut-off machines is that made recently on 2" diam. H.R.Round, Hardness 55, Rockwell B scale. Three well-known Bands and the new DoALL Band were run at a velocity of 165 f.p.m. on a Kalamazoo Saw. The three other saws made 47, 51 and 65 cuts respectively. The DoALL made 95 cuts. You can't beat that for saw performance.

HAVING SAW TROUBLE?

The facilities of our Research Laboratory are available to you without cost. Let our experts get busy on your saw problem and give you a written report of findings and recommendations.



If you own one of the following models (or any other Band Saw Cut-off Machine), these new DoALL Wide Saws will give you better, smoother results with worthwhile savings in time and blading cost.

Avey Milband Clark Crescent Stockbridge Johnson Kalamazoo Klemm Laidlaw
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Best for All Cut-Off BAND SAWING MACHINES



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INDUSTRY'S NEW SET OF TOOLS

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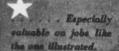
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Close Limits



The B





Grinding Steel Forged Rocker Arms on No. 11 Blanchard Surface Grinder



These steel forged Rocker Arms are ground on a No. 11 Blanchard Surface Grinder, with speed and economy.

Twenty pieces are loaded on a special Blanchard designed fixture. .005" of stock is removed from one side.

1800-2000 pieces are produced per eight hour

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Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.



Deepfreeze Cascade 120° F. Industrial Chilling Machine

Does This Answer Your Questions About The NEW Deepfreeze Process **Cold Treating Metals?**

What is the Deepfreeze Process?

It is the application of Deepfreeze Industrial Chilling Machines for the hardening, seasoning, shrinking and testing of metals by freezing at temperatures down to -120° F. The Deepfreeze process involves a new principle of refrigeration, which permits faster, more efficient heat removal.

What is the Cost of Deepfreeze?

The initial cost of only \$2,500 for the standard Cascade -120° F. Industrial Chilling Machine is quickly recovered in reduced production costs. One manufacturer saved from \$3,000 to \$4,000 per month in shrink-fit application. Gage manufacturers save time and money by seasoning gages to prevent change in finished size. The increased tool life resulting from cold treating reduces down-time and lowers tool cost.

How are Deepfreeze Sub-Zero **Temperatures Being Used?**

The possibilities for applying Deepfreeze Industrial Chilling Machines in your plant are practically unlimited. Here are but a few of the many applications finding widespread use in industry today:

Treating of high speed Testing of aircraft insteel cutting tools. Shrinking of metal.

Shrink-fit assembly. Stabilization of gages. Hardening of precision

machine parts.

struments and ma-

Testing of lubricants, paints, plastics, chemicals, synthetic rubber and pharmaceuticals.

Is the Deepfreeze Process Still in the Experimental Stage?

No! Hundreds of Deepfreeze Industrial Chilling Machines are now being used in actual production. Deepfreeze equipment has been tested and proven highly valuable by such firms as

The General Electric Company, Timken-Detroit Axle Company, Dodge Motors, Pratt and Whitney Division, Monsanto Chemical Company, Greenfield Tap and Die Corporation, Ford Motor Corporation.

How Can Sub-Zero Temperatures Be Adapted to My Work?

If, after checking uses listed here, you are not sure how sub-zero temperatures can be beneficially applied to your manufacturing, let Deepfreeze Engineers help you find the solution to your industrial metal chilling problems. The Deepfreeze representative in your territory will be glad to assist you in handling sample parts for a Deepfreeze test in the factory laboratory. There is no obligation.

What About Delivery?

If you can qualify, under government priority regulations, you can expect prompt delivery on Deepfreeze standard chilling machines.

Where Can I Get More Information?

The complete and latest data on the use of sub-zero temperatures for industrial use can be found in the new Deepfreeze Metal Chilling Data Book. A Deepfreeze representative will be glad to answer other questions you may have and can furnish you with further information.



2319 DAVIS STREET NORTH CHICAGO, ILLINOIS

Industrial Chilling Equipment for Shrinking, Tosting, Mardoning and Stabilizing Metals

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BOYAR - SCHULTZ No. 1 PROFILE GRINDER Improved Design ... Improved Table Do It BETTER . . . FASTER With Boyar-Schultz No. 1 Profile Grinder

- In Tool and Die Work. Replaces slow hand work in fitting dies and punches.
- 2. Grinds odd shapes and difficult contours quickly.
- 3. Speeds grinding and finishing profiles and contours in Production.
- High spindle speed assures efficient grinding even with ½" diameter wheels.
- 5. New Design-Streamlined for appearance and rugged durability.
- New Square Table has serrated top which frees surface of grindings, and permits smoother movement of work and closer tolerances.

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Only by Broaching was this phenomenal Precision Production record possible



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POWER

give more power

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Brute strength has its limitations. Through the years man has increased his output tremendously by the use of mechanical aids. Today, the hand-held portable tool is one of his most useful aids when a job must be done quicker and better.

ANY portable power tool will increase the output of the operator's hands, but a lighter, smaller and more flexible AIR tool will develop more power and will further increase his output.

More types of work can be done with AIR tools than with any other kind of portable tool—not only on operations involving rotary motion (drilling, reaming, grinding, nut running, etc.), but also on percussive work such as riveting, ramming, tamping, etc.

AIR tools are lighter and more powerful in proportion to size than any other type of portable power tool. They are, therefore, easier to handle.

Increase your production with AIR tools—choose from the complete Ingersoll-Rand line.



18-354

COMPRESSORS . TURNO BLOWERS . ROCK DRELS . AR TOOLS . OR AND GAS ENGINES . CONDENSERS . CENTRIFUGAL FUMPS

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"Quality" Adjustable fimit Snap Gages

HEAVY DUTY A.G.D. MODEL "C"

Acclaimed for its ability to maintain accuracy even with hard usage. The contact anvils and gaging buttons are of hardened and tempered tool steel, ground, lapped and adjusted to size. They are held in place by an A.G.D. Locking Device. Assures quick and accurate inspection of duplicate parts. Round or square head buttons optional.

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HEAVY DUTY "KWIK-CHEK" MODEL

Ideal for ease and speed in gaging odd or irregular-shaped pieces. Note the lower anvil extending beyond back edge of top gaging button for aid in gaging counter-bored work, and in lining up work before presenting it to the gaging anvils. An excellent gage for checking end measurements of any kind.



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THERE'S LOTS OF ENTRAPRODUCTION IN EVERY CARBIDE TIP!

CAL-CUTTERS not only enable you to get the last ounce of production out of your standard milling machines... but they also have extra long life because there's ample tungsten carbide on every tip to take heavy cutting loads and permit many regrinds before re-tipping is ever required!

That's mighty important! It means less downtime for resharpening, more metal removed per run, more performance from every Cal-Cutter in the shop.

If you mill alloy steel, iron, aluminum, brass, bronze, dural, magnesium, etc., Cal-Cutters specifically made for the job are

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severance new tool craftsmen regrind worn tools with the same precision and skill they use in manufacturing new tools. They give each flute the pitch and depth required to eliminate chatter. They carefully grind each tooth so your renewed tools take deep sharp bites like a new Severance Cutter.

process that increases tooth hardness and lengthens cutting life 3 to 5 times. It will pay you to send your dull cutters (hand ground, mill or

chisel cut) to Severance for a factory regrind job.

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MIDGET MILLING CUTTERS * PRECISION REGRINDING * Severance Tool Industries Inc., Saginaw, Mich. * Plants in Long Island City 1, N. Y.; Detroit 2, Mich.; Fort Wayne, Ind.; Chicago 6; and Los Angeles 21, California. In Canada: 60 Front Street West, Toranto, Ontario.

Air-O-chek Air Guns

Hoverything

Note powerful double grip afforded by long extra heavy ferrules, machineformed over special shoulder on

Precision made of bar brass and atainless steel.

Jewelers Model FA AIR-O-CHEK — favorite of women war workers because of small size. Furnished with 1/4" or 1/4" female IPT.



Standard Model FA AIR-O-CHEK. Furnished with 16, 14, % or 1/2" female 1PT.



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Model FA AIR-O-CHEKS come completely assembled with long, extra heavy doublegrip ferrules illustrated, ready to screw on male IPT. Based on performance results alone—faster, easier operation—air saving — complete dependability — and minimized maintenance—leading plants all over the country have standardized on AIR-O-CHEK Air Guns.

shank.

The perfection of simplicity—a ball and socket joining the enclosed lever to the valve—that's the secret of AIR-O-CHEK vast superiority.

Leverage afforded by this exclusive feature gives full discharge with a slight flex of the hose. Shut-off is instant and positive, even after years of service. Only the lever and valve move. Packing glands and external levers are eliminated. Leakproof operation is assured. Maintenance is negligible.

RESULTS TALK. Install an AIR-O-CHEK and compare results with the best you have ever had. Prompt delivery on high priorities. Sizes for all requirements,

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They Save Their Original Cost *many times over*In Speeding Up Maintenance and Assembly Work!

HORIZONTAL STATIONARY-TYPE FORCING PRESS

Distance between bars adjustable

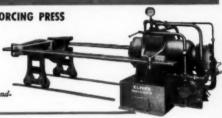
Distance from rom to resistance head adjustable

Self-contained motor-driven pumping unit Long ram stroke Controlled pressing speed Power return of ram

Directional control lever

Complete accessories available

(Also furnished in portable models with bandoperated or motor-driven pumping unit.)





INCLINED-TYPE FORCING PRESS (Wheel Press)

Distance between ram and resistance head adjustable Resistance head mounted on roller-bearing wheels Directional control lever Self-contained pumping unit Power return of ram

Complete accessories available

America's leading production men find these presses ideal for repair work —pressing gears on and off shafts, removing and inserting bushings, pushing shafts out of broken-down pulleys.

Likewise in assembly operations, where forced fits are required, they become a production tool of high efficiency, as in forcing shafts in armatures of motors or pressing locomotive wheels on axles. For assembly operations of this character, Elmes has incorporated rapid traverse features, variable pressing speeds, pressure adjustments, and automatic controls; and, where necessary, has added special work-holding fixtures in their standard forcing-press designs.

Elmes standard patterns cover a wide range of sizes and capacities. For each press complete accessories, such as work-holding fixtures and filler blocks for resistance heads, are available.

Ask the Elmes Engineering Staff to assist you in the selection or design of forcing presses and other efficient hydraulic equipment.

Send for new FREE Bulletin 1055 showing all Elmes forcing presses

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ELMES HYDRAULIC EQUIPMENT

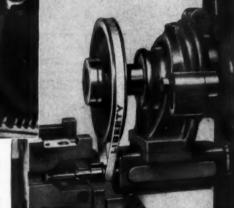
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Grinding Those Difficult Jobs with







ABOVE

No. 90-31 Vertical, sharpening broach with 5° clearance.

AT RIGHT

No. 90-30 Horizontal, grinding a difficult keyway in a hard-to-getat place.

SURFACE GRINDERS DO DOUBLE DUTY

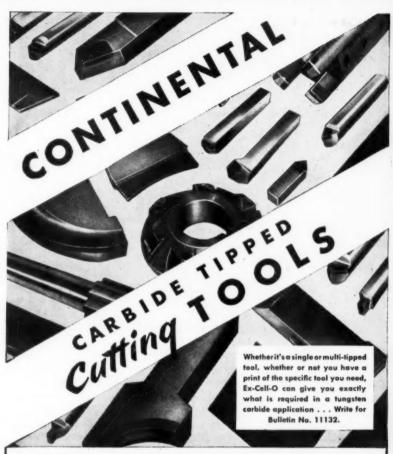
Liberty High Speed Grinding Attachments for surface grinders are precision tooled for greater accuracy on intricate and hard-to-get-at precision grinding jobs.

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Tomorrow's Tools for Today's Tasks



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Precision MACHINE TOOLS . CUTTING TOOLS . AIRCRAFT AND MISCELLANEOUS PARTS



- ★ PORTABILITY—can be rolled right up to the work—reducing product or material handling.
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- ★ LIGHT-WEIGHT WORKING TOOLS-free from motor weight, lessen fatigue.
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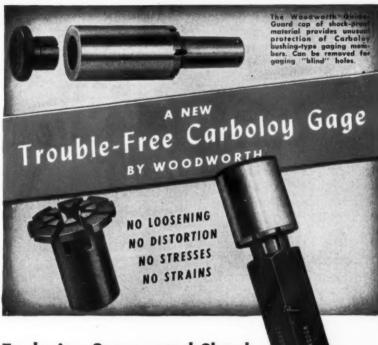
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(Patent applied for)

Woodworth's exclusive segmented shank compensates for differences in coefficient of expansion between cemented carbides and steel . . . thus assuring a troublefree bond between these two metals.

The segments permit "breathing" . . . and allow for expansion or contraction due to temperature changes, with no distortion to the Carboloy gaging member.

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- Gripping surface full length of collet.
- NO lubrication required
- Full spindle capacity up to 1 inch.
- Round collets available to 1" by 32nds.



MIRACLE

Quick opening . . . Quick closing . . . Simple in design. MIRACLE COLLET CHUCK, because of increased production capacity and exacting accuracy, will pay for itself quickly by increasing production efficiency.

Features that cause shop foremen to demand MIRACLE COLLET CHUCK: Simple installation; collet change in less than 60 seconds; no bearings, springs or washers to replace; push-type collet holds stock firm against locating stop; adapters for most collets available.

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Send us your blue prints for quotations on your high speed tool, special tool, and carbide production tool requirements.

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HERE'S THE

New Model Nichols Miller

Here's the New Model of one of the most versatile precision milling machines on the market.

Besides conventional milling, the Nichols Miller performs dozens of unusual operations—such as profiling, boring, turning, facing, diamond wheel-grinding—to tolerances in tenths. Rise-and-fall spindle arrangement and a full line of attachments make the Nichols especially valuable for the toolroom or laboratory.

Worth remembering: Several thousand of these millers are in operation the world over—and we've never required a full-time service man!

WORKING SURFACE: 63/4" x 21", or 63/4" x 30". RANGE: Longitudinal, 10" or 19"; x 30". RANGE: Longitudinal, 10" or 19". Fransverse, 7"; Vertical-Knee, 13/9"; Spindle Rise and Fall, 41/2". STANDARD SPEEDS: to 2400 RPM. SPECIAL SPEEDS: to 5000 RPM. Also Available—Nichols Millers for special requirements. Nichols Double-Spindle Millers for high-production needs.

Immediate Delivery—Send today for descriptive literature and free 86-page Handbook of unusual applications.

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(Left to right) PROFILE MILLING, using template and follower, with remarkable ease of control, work-piece under full view.

RACK AND PINION TRANSVERSE FEED, available in place of standard feed screw for rapid motion on drilling, end - milling and boring operations.



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Saves 2 Hours Set-up 7ime

Transparency permits "on the job" adjustments . . . tool life up 33%

Minutes saved in machine shops today mean lives saved on the battlefields tomorrow . . . and here's how a large plant saves 120 of those minutes on a certain operation.

Transparency of Sunicut makes it possible. Previously they had to stop the machines during the operation to make various tool adjustments . . . requiring 2 hours set-up time. At the suggestion of a Sun Cutting Oil Engineer they made a change in cutting oil - to Sunicut, the transparent, straight sulphurized cutting oil.

Now two hours are saved. Sunicut permits a clear view of tools and work . . . adjustments are made without stopping machines . . . two hours idle set-up time turned into two hours vital production.

Added savings in tool life are realized ... with Sunicut tools cut 33% longer. Operators find Sunicut cleaner to work with . . . and an estimated \$5000 yearly saving has been effected since Sunicut requires no mixing with an expensive base.

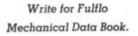
As a result of this record Sunicut has been adopted throughout this plant. Save production time and money in your plant, too. Apply the advantages of Sunicut to your cutting oil problems. A Sun Engineer can give you full information. Write



SUN INDUSTRIAL PRODUCTS HELPING INDUSTRY HELP AMERICA

FULFLO PUMPS and VALVES







COOLANT PUMPS

for efficient performance

Centrifugal pumps which lift coolants and send them where you need 'em most at the speed required . . . efficiently, constantly, smoothly.

Scores of models enable you to select the pump to serve you best ... special models for special purposes, of course.

Sizes %" to 11/2". Flexible, compact, simple. Right or left rotation,



Model AOR



Specialties Co., Inc.



T-J AIR CYLINDERS exert power movement from 100 lbs. to 12,000 lbs. (direct). T-J HYDRAULIC CYLINDERS exert power movement from 1000 lbs. to 50,000 lbs. (direct). Available in sizes, styles and strokes to meet your requirements. Precision-manufactured and expertly engineered with T-J's quarter century experience. Write for latest extalogs. The Tomkins-Johnson Co., Jackson, Mich.

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RIVITARE AND EXPERINCE CELLINERALS

FOR TOUGH JOBS SPECIFY

TOMKINS-JOHNSON
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BENCHMASTER'S 6" ROTARY TABLE

benchmaster—the name for quality bench machine tools—now offers its small, accurate rotary table at \$45 (FOB Factory). Increased production—by your demand for this rotary table—improved workmanship; giving an even higher standard of quality, have made this new price possible.

Table diameter—6" · Worm Gear Ratio—60 to 1 · Bevel Dial Graduated in 1/10 of a degree · Table Graduated, 360° · Center Hole—¾" · "T" Slots—¾" × ¾" · Two crossing at 90°, forming two quadrants · Height—2½" Weight—14½ lbs.



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Selective COPPER BRAZING IN UPTON ELECTRIC SALT BATH FURNACES

NO DECARBURIZATION

MINIMUM DISTORTION

LESS SCRAP

NO BLOWN COPPER

NO ELECTRODE TROUBLE

Selective Brazing of ordnance part subjected to intense impact is being handled at high speeds in Upton Electric Salt Bath Furnaces.

These same furnaces are being used, alternately, for high speed steel hardening and copper brazing.

When inquiring for addi-tional information, please give complete details on your problem so that our answer to you can be complete.

In Detroit there is an installation of Opion
Electric Salt Bath Furnaces kept in operation for your inspection.

ELECTRIC FURNACE DIV.

See a battery of Upton furnaces in operation.

7437 MELVILLE AT GREEN DETROIT 15. MICHIGAN IT'S NO TRICK
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TORIT DUST COLLECTORS

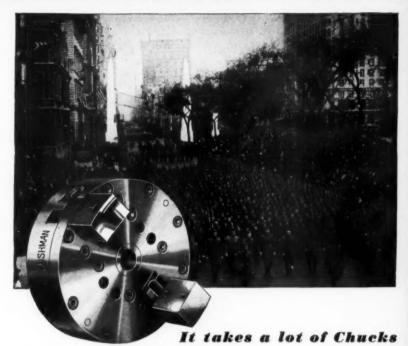
In industrial cutting, grinding, and polishing operations a manufacturer is immediately confronted with a dust problem. Abrasive dust is a menace to valuable machinery and the health and efficiency of employees.

TORIT Dust Collectors clean and recirculate air in one operation. Being portable and completely self-contained they will fit into your present production layout and any future alterations. For complete information write:

TORIT MANUFACTURING CO.
303 Walnut St. St. Paul 2, Minn.



TORIT Dust Collectors



to make a VICTORY . . .

There isn't a piece of mechanical equipment in the war today . . . in the air, on land, on the sea or under it . . . that has not required the services of chucks in its manufacture.

As a result, chucks are among the most vital tools and the most needed weapons for the long, strong pull ahead of us. Therefore, we endorse and re-emphasize the Government's urgent call for Tool Conservation.



We know from long experience that most chuck failures are the result of: 1, Lack of lubrication; 2, Overloading; 3, Lack of cleaning.

There are six simple chuck maintenance rules that will save you time, money . . . and CHUCKS. They are printed on handy "Chuck Check" maintenance cards we supply free of charge for distribution to operators. Write for your supply, The Cushman Chuck Co., Hartford 1, Conn.

A WORLD STANDARD FOR PRECISION

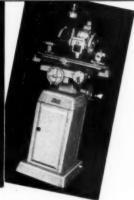




UNIVERSAL TOOL GRINDERS







MODEL B600 UNIVERSAL TOOL GRINDER is built for 24 hour service. Maintenance or production at minimum cost. Write for bullettin U31.54. MODEL B604 UNIVER-SAL CARBIDE TOOL GRINDER is built for fast and accurate grinding of conventional single point tools. Write for bulletin C31-54.

MODEL B660 UNI-VERSAL TOOL GRINDER with multiple speed head is a new member of the K-O family. Operator has choice of nine speeds ranging from 1000 to 11,000 RPM. Write for bulletin M31-54.



K. O. LEE COMPANY
ABERDEEN SOUTH DAKOTA



You'll find the Why, What, Where and When of POPE Spindles clearly covered in this boiled-down Bulletin that you can read in two minutes flat.

You'll agree when you've read it that the story of POPE Precision Sealed Lubrication Spindles is worth that much of your time and maybe a whole lot more.

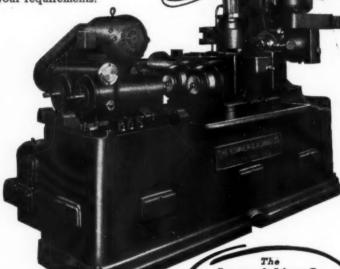
It's yours for a penny poetcard. Just jot down your name, position and company address and say, "Send me Bulletin T.



PRODUCTION NOLL INCREASER

· This hydraulically operated machine has four milling cutters for milling relief forms in aircraft engine parts. Engineered to a particular job? Yes, but, like Sommer & Adams machines generally, capable of many variations in design and purpose to fit individual requirements your requirements.





Sommer & Adams Co. places at your command a 25-year acquaintance with the intricacies of special design and construction.



THE SOMMER & ADAM

COMPANY

Store A OF SOUIDMENT SOD MANY DIDDOGGE



Abrasive RESINOID DIAMOND WHEELS

When you need diamond wheels in a hurry, just remember that you'll get ACTION from ABRASIVEI Not only IMMEDIATE DELIVERY, but also faster cutting, better finishes on carbide tools.

ABRASIVE Diamond Wheels offer you the advantages gained in three generations of diamond experience, combined with modern research and testing facilities that strictly maintain highest standards of performance. Abrasive's engineering service assures you the right wheel for each job.

Specify ABRASIVE once , . , and you'll standardize on it for use in your plant.

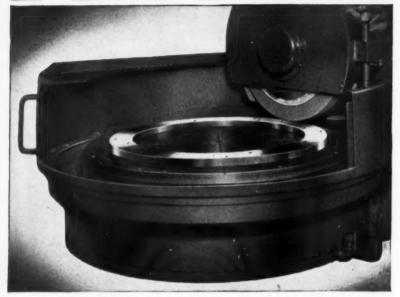
ABRASIVE DRESSING TOOL CO.

DETROIT, MICHIGAN
INIED GENERATION OF
DIAMOND INVESTIGATION
THOSE, wire or write for our new categor such as

Phone, wire or write for our new catelog which contains specifications of the wide variety of wheels and hones in our Standard line. Special wheels quoted to your specifications.

Distributor Territories Open . . . PHONE, WIRE OR WRITE FOR DETAILS!

ARTER



ARTER Rotary Surface Grinder (Model A)

Grinding thrust ring—one of many operations successfully performed by ARTER Model B Hydraulic Rotary Surface Grinder. High degree of flatness, parallelism and finish required. ARTERS give you versatility and precision. Capacities 20", 24", 30" and 40".

ARTER GRINDING MACHINE COMPANY



WORCESTER, MASSACHUSETTS . U.S. A.





War restrictions on the manufacture of Jessop High Speed Steels have been removed. Jessop can again offer the same pre-war analyses-the same pre-war quality to give the same dependable performance for which they have become noted. In addition to the regular commercial forms, such as bars, sheets, plates, and drill rods, a complete line of ground and unground high speed cutting bits and carbide-tipped tools are available for immediate delivery.

When requisitioning high speed cutting tools, specify these famous Jessop Brands:

- King Cobalt (19-4-2+12Co)
- Purple Label Extra (18-4-2+9Co)
- Purple Label (18-4-1+5Co)

- Malta (Carbide Tipped Tools)
- Supremus Extra (18-4-2)
- Mustang Special (6-6-2+5Co)

- Mogul (Moly Type)
- Mustang (6-6-2Type)
- Supremus (18-4-1)



ESSOP_STEE

HEAD OFFICE AND WORKS WASHINGTON ... PENNA



EVEN as you—and all of the rest of us
—have contributed men to the Armed
Services, so has your Industrial Supply
Distributor.

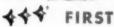
Most of these ISD men had sound training before they ever put on the Uniform. They were trained to locate supplies of scarce or critical materials for your plant—trained in getting them to you on schedule—trained in anticipating your requirements.

Now in the various technical branches of the Services, these men are learning a great deal. They will bring back new experiences, new skills and new ideas from which you are sure to benefit. Today, new men are in the making—for you.

Meanwhile, please continue to call upon your Distributor for all of the things you need instead of ordering direct from the factory. The older and more experienced men are still there—you will simplify the manufacturer's job—and will help to ease the carriers' loads as well.

Get this good habit and heep it-

Telephone your







TWIST DRILL COMPANY 1242 EAST 49 STREET CLEVE LAND



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3-FOLD SAVINGS!

是是太 1. MEN . . .

A smaller maintenance crew can service a larger number of machine tools when Hoffman coolant conditioners are on the job. Hoffman filters continuously deliver waste solids in dry form for easy disposal.

ថ្ងី**ទី 2. MONEY...**

Hoffman Model I-18V self-cleaning coolant conditioners effect large savings in maintenance, in coolant replacement, in longer life for machines, cutting tools and grinding wheels, and in fewer rejects.

② ⑤ 3. MINUTES . . .

*Round-the-clock operation becomes a reality. Hoffman filters eliminate shutdowns for sump cleaning, add more productive time to grinding machine operation, frequently permit faster operating speeds.



WITH HOFFMAN I-18V SELF-CLEANING COOLANT CONDITIONER

MODEL 1-12V HAND-OPERATED ALSO AVAILABLE

U. S. HOFFMAN MACHINERY CORPORATION 215 LAMBAGE SER. STREETS R. ST

WELDERS SPOT BUTT ARC

We manufacture a complete line of resistance spot welders from 1/4 to 300 KVA for all types of welding. There is an EISLER WELDER for every purpose.

WRITE FOR CATALOG

WE INVITE CONTRACT SPOT WELDING IN LARGE OR SMALL QUANTITIES.

No.600-KK



ARC WELDERS 100 TO 400 AMPS.



BUTT WELDER!



SPOT WELDERS



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FOOT, AIR OR MOTOR OPERATED

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Now · · ·

A MULTI-TIP DRILL!

CUTS YOUR DRILL INVESTMENT



IN
INVENTORY
AND
STORAGE SPACE

Here's the new advance—the new development for larger sized drills you've been waiting for—the Conner Multi-Tip Drill.
Comes in standard taper-shank holders. Standard drill tips are furnished to drill from the solid. Each holder will accommodate several interchangeable drill tips (standard size). These tips are made of hardened high-speed steel in steps of 1/16". Special holders and special sizes also available, permitting many extensions.

For special applications, one design permits oil under pressure to be flushed directly on the cutting edge of the drill tips by having an oil hole through the shank and forking out to each lip of the drill. Then there are extensions for deep hole drilling with cross slots on the end which fit the rectangular section of the holder—thus taking all the strain off the tang. Any type or size shank can be furnished, straight for fitting directly in turrets, or tapers for spindles.

Write for literature and prices. Learn at what an unbelievable low cost you can be fully equipped for every drilling need.

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5555 Conner Ave. • Detroit 13, Mich.

Please send me literature on MULTI-TIP DRILLS.

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18" and 24" English Measure
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AUTOMETRIC CORPORATION

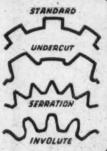
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VERNIER HEIGHT GAUGES EXCLUSIVELY

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EXTERNAL SPLINES and SERRATIONS

GEARGRIND Machines grind production runs economically, while retaining the close tolerances demanded by your engineers. In producing spline gauges and spline broaches, where extreme accuracy and high finish are required, GEARGRIND Machines are tops. May be equipped with adjustable micro table stop, for grinding splines of cramped design or blind spline runout. Sound engineering, painstaking craftsmanship, semi-automatic operation and smoothness characterize these machines. They employ the same type of low pressure, hydraulic system used in the complete line of GEARGRIND Machines in the formed wheel grinding of external and internal involvée splines, straight splines, serrointons and racks, external, and internal involvée splines, straight splines, serrointons and racks.

We also design and build special machines for special jobs, particularly jobs where the economies of Formed Wheel Grinding may be utilized. General Catalog on request.

GEARGRIND TYPE 5G-15

Has a between-centers capacity of 60°.

Other types have between-centers capacities of 24°, 42° and 80°. Complete specifications in catalog.



The Common of th

MACHINE COMPANY

THE Springfield PRECISION LATHE

Tool Room Lathes are equipped with lead screw reversing mechanism, producing right and left hand threads and feeds. Has automatic stops for both lead screw and feed rod. Oil pan is also included as regular equipment. Bed constructed of High Test Nickel Chrome Gray Iron.

Gear box is tongued, grooved and bolted to front of bed and is the enclosed type to exclude dirt and chips from gears. Wide gears and heavy shafts with ball and bronzed bear-

ings used throughout.

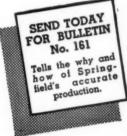
36 changes of threads and feeds are obtained, and in connection with the reverse gears, either right or left hand threads can be produced without the use of wrenches.

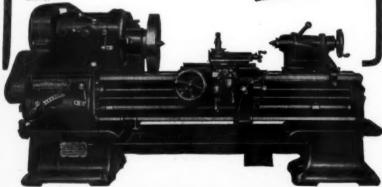
Massive tailstock, designed and constructed with long bearings on bed, is commensurate with the powerful headstock. All bearings and

ways are oiled from one well.

Regular equipment includes large and small face plates, tool posts, steady rests and all necessary wrenches. Motors are located in large cabinet leg under head stock connected to machine by either V belts or silent chain drive.

BUILT TO GIVE MAXIMUM VALUE

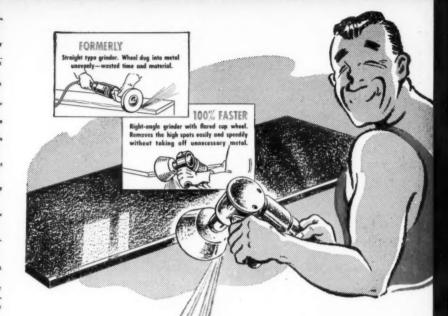




THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD

OHIO. U. S. A



how we steered them to a 50% saving

THE sparks were flying but not fast enough, thought the Rotor Application Engineer who looked over this job in a fabricating shop. They were using straight type High-Cycle grinders with 8-inch wheels for grinding bevelled edges of plates. This type of wheel dug into metal unevenly—wasted time and material.

"The right tool for this job," said the R.A.E.,
"is a right-angle grinder with a 6-inch flared
cup wheel. This type removes the high spots
easily and speedily without taking off unneces-

sary metal." The change was made with these results:

- 50% saving in grinding time (or 100% more production).
- 2. Smoother, more uniform bevels.
- 3. 40% longer wheel life.

We'd be glad to help you make sure you have the right Air or High-Cycle tools to get maximum production and minimum costs with available man-power. No obligation.

Yours for the right tool,

HIGH-CYCLE O'TOOL

ROTOR TOOL

HIGH



To make machines run longer before requiring attention to centers—choose the center with the helical groove—made only by CMD. The exclusive advanced design, with the left-hand Helical Groove, assures more complete and longer lasting lubrication of point and work. No more burned-out center points! No stopping machine to relubricate center! No readjustments of tail stock! When CMD Helical Groove Centers are lubricated with CMD Center Point Oil, running time is frequently increased as much as 1500 per cent.

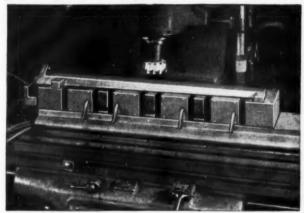
CHICAGO MANUFACTURING & DISTRIBUTING COMPANY Dept. SBB, 1928 West 46th St., Chicage 9, III. Send circular on CMD Helical Groove Centers. Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT Oil. and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amonging, simple test. NAME FIRM NAME ADDRESS



MAGNETIC CHUCKS

"DID IT"

FROM 3.1 Hours TO 1.2 Hours



"With your chucks, we cut machine time on tapered gibs, from 3.1 hours to 1.2 hours." Mattison Machine Works, Rockford, III.

These chucks operate through our 110 Volt A.C. Control Unit, Dependably Dry Plate Rectified to only 6 Volts D.C.

Hand type lifting magnets—weigh 6 lbs.—lift over 100 lbs. Rotating chucks for special applications.

LET US HELP YOU SOLVE YOUR HOLDING PROBLEMS, WITH ROCKFORD MAGNETIC PRODUCTS.

ROCKFORD MAGNETIC PRODUCTS CO.

(Formerly Anderson & Brown)

1018 Sixth Avenue Rockford, Illinois

Certain territories still open for sales representatives. Correspondence solicited.



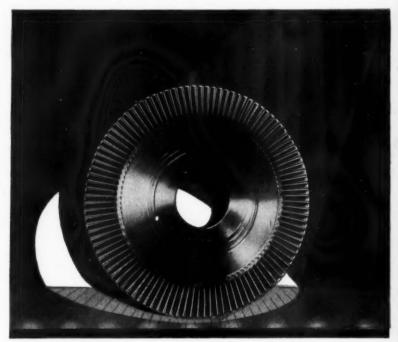
● On this one machine you can lap and polish — quickly, precisely — a wide variety of small metal and plastics parts, each at its most efficient finishing speed!

● Schauer Ideal Variable Speed Lathes provide a wide range of spindle speeds—in a ratio of 11 to 1 with a two-speed motor, or 6 to 1 with a single-speed. Write for Catalog 440, showing and describing various models and sizes.



SCHAUER MACHINE

ORIGINATORS OF TODAY'S SPEED LATHES



In the Spotlight"...

for Post-War Mass Production of Turbine Broaching

BROACHES, all types and sizes ... GAGES, Serration, or Spline, male or female ... Master Gears and Gear Racks ... Master Index Plates ... Splined Arbors for gear-grinding ...

Hobbing, Shaving and Checking . . . Gear Designing and Engineering . . Form Cutting Tools . . Production Broaching and Machining.

Broach & Gage Company 1908 FRANKLIN STREET DETROIT 7. MICHIGAN



Here's Fast
Accurate
Economical
Thread Cutting!

Self-Opening DIE HEADS

embody features that make them ideal tools for general purpose work. Simple yet rugged in construction, they are positive in opening and easily adapted to practically every thread cutting operation within their capacity. All parts are of hardened steel, ground to absolute accuracy. A minimum number of parts reduce wear and make for long life.

Style T Die Heads are made in capacities from 1/8" to 2". Style B Die Heads may be had in capacities from 21/2" to 7". Thus, a small investment enables a shop to handle a wide range of thread cutting jobs. For more complete information send for Bulletin M-123.

We Can Make Prompt Shipment—What Are Your Requirements?

MODERN TOOL WORKS

CONSOLIDATED MACHINE TOOL CORPORATION



Industrial Steels, Inc. of Cambridge, Mass., use a Hevi Duty Vertical Retort Furnace in their process of surface hardening stainless steels. In this new development the design of this furnace lends itself to the proper breaking up of the ammonia gas to give a highly uniform case and economy of operation.

HEVI DUTY ELECTRIC COMPANY

HEAT PREATING FURNACES HEXISTET SECTION EXCLUSIVELY

Send for Bulletin HD-142



2000 HOLES PER REAMER - Instead of Only Seven!

Here is a war-production fact that sounds fantastic — yet its truth brings striking evidence of the superior performance of L & I Ground Flute Reamers, when they replace ordinary milled flute reamers.

The Oilgear Company of Milwaukee reports that with milled flute reamers they were usually unable to complete with one reamer the seven holes required in an important piece. They are now using L & I Ground Flute Reamers and are producing an average of nearly 2000 holes per reamer.

If you haven't tested the keener cutting edge and longer lite of L & I Ground Flute Reamers against the ordinary milled flute reamers you are now using, why not send us a trial order—or write for literature?



REAMERS

LAVALLEE & IDE, INC. . Chicopee, Mass.



GONE FOREVER-battered and

PULLERS do the job the FIRST for sale sure separation. They time. No Delay. Use ACRO PULLERS for sale sure separation report are fast-accurate-positive. War plants using these pullers report damaged die sets caused by prying damaged die sets caused by prysing or hammering. ACRO DIE SETT PULLERS do the job the FIRST

are fast—accurate—positive. War plant savings as high as 50% in time alone. ACRO PULLERS are indispensable for the grinding, mounting and ACRU FULLERS are indispensable for the grinding, mounting and fitting of punches, enabling the operator to raise punch from die easily, litting of punches, enabling the operator to raise punch from die easily, quickly and smoothly, positively holding the set at any desired height.

Order a set today. Convince yourself of the savings you can make in your tool room. ACRO PULLERS furnished in three sizes. Write

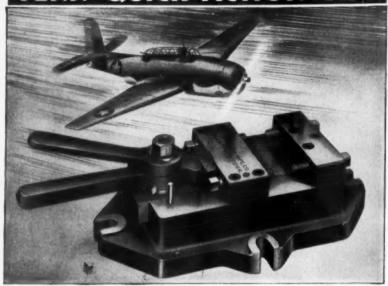
now for more information.

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332 E. RESERVOIR AVE.

MILWAUKEE, WIS.

FENN QUICK-ACTION VISE

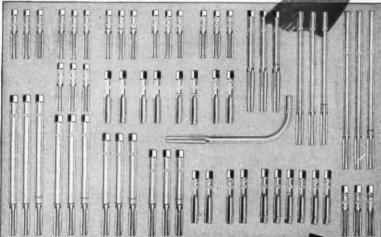


The War Time Tool that Will Speed Up Peace Time Production

It took a war time emergency to show war production plants the many advantages of the Fenn Quick Action Vise for small parts handling. Wherever there's a milling, drilling, tapping or assembling operation, there's a waiting job for a Fenn Vise, such as small parts for airplanes, machinery, automobile, precision instruments and tools. All working parts made of hardened ground steel. Precision fitted jaws, perfectly aligned. Three sizes: 4", 5", 7". Send for Bulletin No. 15 today.

THE FENN MANUFACTURING CO. HARTFORD, CONNECTICUT





IT'S TRUE. Shown above are the 61 different kinds of 3"-13 N. C. Taps which "Greenfield" lists in its catalog, not including special "Maxi" finish tops. Many look identical, but each has its own particular qualities and usefulness. . . . Which one will do the best job for you? That is a "\$64 question" that Greenfield helps you answer in its new booklet "Selecting the Right Tap for the Job." If you need more help, you can call on Greenfield's staff of expert screw thread engineers for recommendations, or ask a Greenfield field service engineer to call.



GREENFIELD TAP & DIE CORP.

GREENFIELD







Is a FORD File

But Ford makes three distinct types of rotary files. We make three because a definite need exists for three . . . HAND CUT FILES ARE SUPERIOR on harder metals which call for a wearing, filing action-cast iron, steel forgings, gas or electric welds . . . GROUND CUTTERS ARE SUPERIOR on softer materials-aluminum, magnesium, plastics—anything requiring a cutting chipping process . . . CARBIDE CUT-TERS ARE SUPERIOR on any job. You'll get 50 to 1 performance from Ford Carbide Cutters over those of high speed steel. Carbide is harder biting, faster cutting, longer lasting-requires fewer regrinds. Higher priced of course . . . Which is your type?

Let Ford engineers answer your problem for you. Write today. M. A. Ford Mfg. Co., Inc .- 746 W. First St., Davenport, Iowa.



The mark of a 600D File





on many WAR JOBS with

Gardner-Grinding!

THAT'S what many shops are doing today on a wide variety of flat surfacing operations.

The aircraft piston-rings, the fragmentation bomb cages, the torpedo-fuses, the bullet cores, which are ground on the 4 special Gardner Grinders shown here, are only a few examples of important war jobs handled quickly — and ACCURATELY—thru GARDNER-GRINDING.

Call in GARDNER when you're obliged to turn out a flat-surface part in a hurry—a staff of experienced engineers is instantly available to solve your problem—and deliveries are getting better every day!

And - you NEED complete data on GARDNER-GRINDING for your files - WRITE FOR IT!

GARDNER MACHINE COMPANY
436 East Gardner Street Beloit, Wisconsin, U.S.A.

Here's What the Accuracy of the SUNNEN PRECISION HONING MACHINE Means to YOU!

ABSOLUTE INTERCHANGEABILITY—Because tolerances can be held to within .0001". In fact, accuracy has been held to within .000025" on production jobs. Holes are honed straight and true, without taper or bell-mouth,

LONGER LASTING PARTS—Because it produces a super-smooth finish of from 2 to 3 micro-inches. Bearings, bushings, sleeves, etc., run more smoothly; they can be fitted more closely. The smooth base metal finish, free from high spots, makes parts last longer because they wear more slowly.

In addition, the Sunnen Precision Honing Machine is easy to set up — usually taking less than one minute. Skilled labor is not needed. It's practical, inexpensive, and easy to operate.

Write for free bulletin — or ask a Sunnen engineer to give you complete information on how Sunnen Honing can be used in your plant.



The Sunnen Precision Honing Machine handles any internal diameter from 183" to 2.625" in any metal or plastic except lead or babbis, Accuracy is guaranteed within .0001".

1

Typical Jobs



Hydraulic Control Bushing, Haning gives straight round hale after rough reaming.



Cast Iron Volve Stem Guide. ½ to one-thousandth removed — 220 pieces per hour. Better finish and straighter hole.





Seat. Hele is honed to .0002° limit,



Automobile Distributor Shaft Geors, Taper removed at a rate of 80-90 per hour,



Compressor Yoke. Alignment maintained and better finish produced.

SUMMEN



Aircraft Valve Tappet Roller, Honed after grinding to give 100% bearing surface.



Shall Loading Die



Alteraft Carbureter Operating Valve Sieeve. Sunnen honing eliminates distortion from assembling operation,

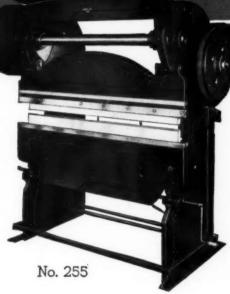


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SUNNEN PRODUCTS COMPANY 7935 Manchester Ave., St. Louis, Mo.

Canadian Factory, Chatham, Ontario

Powerful CHICAGO STEEL PRESS BRAKE



We also build special machines for intricate bending operations.

Take advantage of our experience of over 40 years by sending to us any difficult bending problem you have.

This No. 255 is a POWER-FUL, rugged, inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

This money-saving production tool will handle 40 to 50 percent of the work done in an average shop. Greater speed, higher efficiency—much lower operating cost—plus the highest quality material and sturdy welded construction as in our larger machines.

Standard Series — 3 sizes — capacities 14 gage, 4 ft. long; 16 gage, 5 ft. long; 18 gage, 6 ft. long.

Heavy Duty Series—3 sizes—capacities 10 gage, 4 ft. long; 12 gage, 5 ft. long; 14 gage, 6 ft. long. Powered by ¾ to 1½ h. p. motors.

WORLD'S LARGEST MANUFACTURER OF HAND BENDING, POWER BENDING AND POWER PRESS BRAKES

DREIS & KRUMP MANUFACTURING CO.

7440 LOOMIS BLVD., - - CHICAGO, ILL.

SEND FOR NEW BOOK "FORMING PRESS DIES AND THEIR USES"



GRIPPING FORCE 15 TIMES AIR LINE PRESSURE!

America's war plants are switching to new, powerful Speedy Air Vises! From a single vise ... to an installation of fifty ... they are saving time, effort and labor costs! Air operated, foot controlled-both hands are left free for more rapid drilling, tapping, light milling, assembly, etc. \$0 Complete with Foot Control Valve, Air Hose and Fittings, only

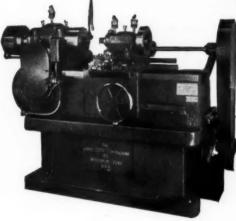
DELIVERY 7-10 DAYS! ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT



W. R. BROWN CORP., 5724 ARMITAGE AVE., CHICAGO 39, ILL.

THE COULTER





FOR THE RAPID
DUPLICATION OF
RIGHT OR LEFT
HAND THREADS
—INTERNAL OR
EXTERNAL

Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chucks, or special face plate fixtures . . . can be threaded on this machine.

Set cam-controlled automatic cycle on first piece. Thereafter, cutter feeds into work to proper depth and at correct pitch and withdraws when cut is completed. Work and cutter spindles are driven by individual motors through worm drive, affording ample power throughout the wide range of speeds and feeds.

Write for Details and Specifications.

The James COULTER Machine Co.

BRIDGEPORT

CONNECTICUT

U.S. A



With Nearly 2 MILLION BITES per minute They Cut Sheet Steel Like Butter

With the bite of nearly two million saw teeth per minute frictional heat is produced, which makes the cutting of mild steel sheets up to ½ inch and non ferrous materials of greater thickness (either formed or flat) with these machines the fastest, smoothest method in existence... a fact which is soundly attested to by their production records in the majority of the country's leading aeronautical plants and hundreds of other metal working factories. Smooth, vibrationless and perfectly safe, these machines are designed specifically for high speed operation by the originators of the high speed band saw, and embody many patented features found in no other band saw. If you want to step up production and cut costs, by all means write for bulletin, "HIGH SPEED METAL CUTTING BAND SAWS."

OTHER TANNEWITZ PRODUCTION EXPEDITERS: FOUNDRY BAND SAWS.—Single and variable speed for cutting off gates and risers of castings of any size or metal; DI-SAWS.—for inside and outside sawing, chain filing, and polishing. Write for bulletins.

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.

Facilitates Production Millions

Facilitates Saves Millions

Sources of the small compact, low-cost

Delta Machine Tools

• Use of these portable machines for heavy-duty production was a prewar discovery . . . adopted in almost every branch of industry to meet the war crisis . . . and now an integral part of American manufacturing methods for the post-war era.



Here's how you

facilitate production

Portability—Delta machines can be moved instantly.

Flexibility—Revise layouts at will, to get best sequence of operations.

Adaptability — Small and compact, Delta machines can be added to present layouts to save waiting, to provide extra operations during idle time, etc.

Special-Purpose Machines
—Built quickly at little cost,
out of standard Delta elements.

Here's how you

fixed overhead.

save a lot of money

Low First Cost—Frequently, Delta tools to do a given job cost a fraction as much. Low Fixed Charges—Delta equipment holds down your

Lower Power Cost — Delta tools, employing smaller motors, frequently cut power cost 30% to 60%.

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Latest Production Equipment — The finest available. Rotating parts dynamically balanced. Ball bearings preloaded. All spindles, arbors etc. precision-ground. Ballbearing seats, etc. diamondbored.

The Delta-Milwaukee line is diversified ... TURN THE PAGE

New economies in

. with low-cost, dependable



Delta Power-feed **Drill Presses**

Worm - driven power feed operates directly off motor giving 8 rates of feed for each spindle speed. One swift hand motion brings drill down to work. Automatic stop and spindle switching from heavy power-feed operations to sensitive hand drilling. 17-inch single spindle drill presses available in 24 different models.



Many outstanding features, including smooth-working tableraising mechanism, built-in depth gauge, streamlined safety belt guard, quill with 5" stroke or travel, etc.



Delta 6" Abrasive Belt Finishing Machine gives you top efficiency

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Delta 14 Metal-Cutting **Band Saw**

Cuts anything from carbon steel to asbestos - has dozens of uses (4 metal-cutting speeds, I woodcutting speed). Delta features: 10 New Departure Self-sealed ball bearings. Heavy table, 14" x 14". Simple. foolproof gear drive. Guides give micrometer accuracy. Safety features complete.



Delta Cut-Off Machine eliminates expensive finishing

Cuts plastics, non-ferrous metals, etc. to exact length with polished smooth-

DELTA - MILWAUKEE . . pioneers of small compact.

high-production tooling **Delta Machine Tools**



Deita Floor-Type **Multiple-Spindle Drill Presses**

4-spindle model illustrated. 2-spindle model also available with one-piece table. Floor types with sectional tables: 3-, 4-, 5-, 6-, and 8-spindle.

Delta Toolmaker Surface-Orinder gives dependable. trouble-free results

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ment's notice.

With the Tool and Cutter Grinder Attachment . . . it the first truly universal becomes the latest devise for grinding, drill-ing, and milling, this machine serves as a development in Tool and Cutter grinding. Sim-ple, accurate, and very low in cost. Delta conpendable, accurate Chip-Breaker Grinder. Holds struction features assure the tool at any conperfect alignment and ceivable angle - accufreedom from play. Subrately reset at a mostantially built, machin-



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Free from vibration. for delicate grinding of carbide-tipped tools. Team it up with the Delta standard tool grinder for hogging down the steel shank.



Delta Tool Grinder with Twin-Lite Shields

gives you extra convenience, efficiency,

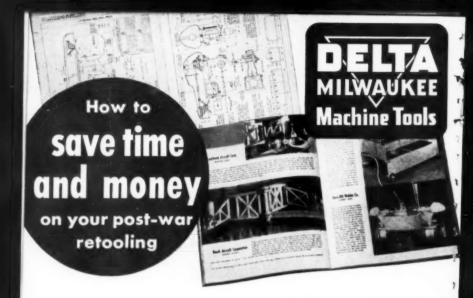
Twin-Lite Safety Shields act as "built-in goggles," flooding the work with light.



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ed to close tolerances.

durable. low-cost machines for heavy-an



- with high-production, low-cost special-purpose machines built from standard Delta Units...

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-Size	APPROX. WEIGHT	HEIGHT	TOLERANCE	NET PRICE
31/2×4	5 Lbs.	21/5"	.0001"	\$ 12.50
6x 6	11 "	21/2"	.0001"	19.00
8x 8	22 "	3"	.0001"	23.00
8×12	38 "	31/5"	.0001"	35.00
9x12	40 "	31/2"	.0001"	35.00
10×10	43 "	31/2"	.0001"	35.00
12×12	50 "	31/2"	.0001"	43.00
12x18	85 "	4"	.0001"	68.00
14×18	100 "	4"	.0001"	75.50
16x16	100 **	4"	.0001"	75.00
18x18	140 "	41/2" 5"	.0001"	98.00
18x24	200 "	5"	.0001"	133.00
18×36	310 "	61/4"	.0002"	174.00
20×20	160 "	51/4"	.0001"	123.50
20x30	325 **	51/4"	.00025"	190.50
24×24	334 "	6½" 7"	.00025"	180.00
24x36	475 "	7"	.00025"	275.00
30x36	510 "	7"	.00025"	345.00
30x60	1425 "	10"	.00025"	596.50
31x78	2100 "	10~	.0003"	827.00
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The distinctive performance of MO-MAX High Speed Tool Steel has established its superiority in production tools for the most severe service. MO-MAX makes tools that are harder and tougher — have superior cutting quality. The steel is easy to machine, grind and weld. It saves 8% in the weight required to make a tool.

- . The color of the sperks is orange.
- . Most of the sparks end in a spear head, usually curved.
- · Very lew branches or stars appear on the spark lines.

By its sporks, MO-MAX Molybdenum Tungsten High Speed Steel may be distinguished from:

Machinery Steel . . . by the orange color, fewer

branches and sporks.

Carbon Steel.... by the orange color and spear heads instead of stars.

heads instead of stars.

18% Tungsten Steels . by the orange color, the spear heads and more sparks.

These distinctive sparks make it possible to identify the steel when labels are lost, to check up on tools of unknown composition, to sort mixed scrap.



Leading steel companies in North America and Durope are licensed to make MC_MAX. A booklet is available giving the latest date on Molybdenum Tungstee High Speed Steels and microscopic comparisons with 184-1 under different beat treatments. Write for your copy to The Cleveland Twist DNI Co., Cleveland, Chibo.

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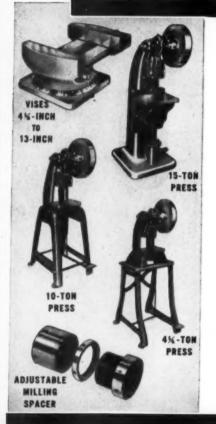
Mo-MAX

HIGH SPEED

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Unlike ordinary one-character dies, which must be used separately, the Mercury holds the entire part number-up to 16 digits, if needed. You simply "load" the tool with the correct part number and snap the cover shut. Thereafter, as many duplicate parts as desired can be quickly and neatly stamped with just a single blow of the hammer for each part! Time normally lost using a separate die for each separate digit is saved, and overlapping, wrong sequence and illegible numbering are eliminated.

The Mercury Type Holder has many more outstanding features you should know about. Type is quickly interchangeable for different part numbers . . . compactness gids in stamping smaller parts ... allsteel machined construction insures long life, cuts replacement needs. Hardened and ground hand-cut steel type is available in a full range of sizes. Full details, including ordering data and specifications for both hand and press style holders, are contained in descriptive bulletin mailed free on request. Write for your copy today—ask for Mercury Bulletin 1-B





Again Federal steps ahead with new improvements and refinements in the design and construction of its Dial Indicators. Effective at once all models, except the "A" size, will include the following improvements:

Better Proportioned Gears— Revised gears enable more positive mounting with less danger of loosening. Greater strength in the rack gear is obtained because of its new and larger size.

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Greater Strength - The rack slide is held more positively.

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"Enclosed pictures in our plant prove the DI-ACRO Bender will do a real production job. We are making 4,000 completed parts per day which is competitive to most Power Presses." (Name on Request.)

Here is an example of "DIE-LESS DU-PLICATING" typical of a great variety of formed parts readily made with DI-ACRO Precision Machines, — Benders, Brakes, Shears. Picture below shows the DI-ACRO Bender making an acute right angle bend and photograph above shows the finished part formed to die precision. Women operating DI-ACRO units maintain a high out-put on production work.



DI-ACRO Shear



Squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. 3 sizes. Shearing widths, 6°, 9°, 12°.

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Forms nonstock angles, channels or "Vees". Right or left

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showing DI-ACRO Precision Machines and many examples of parts made with "DIE-LESS DU-PLICATING".



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Welded steel tubing produced by a certain midwest mill is used for various purposes necessitating precise and uniform outside diameter. The important job of maintaining the forming rolls in correct shape and accurate dimension is performed by a Dumore Precision Grinder. The axis of the quill is placed at right angles to

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The increasing use of the Dumore Precision Grinder on production operations is a natural result of its abundantly demonstrated adaptability as well as the high precision of its operation. Many unusual applications are illustrated in the Catalog 42. Send for a copy. The Dumore Company, Tool Division, Dept. TE27, Racine, Wisconsin.



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Thread Grinding is a special operation efficiently performed by the Dumore ... This bulletin explains how. Send for copy today.

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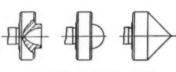
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ALCO

COMBINATION ROLLER STOP and SUPPORT





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A NEW TOOL FOR YOUR SCREW MACHINES WHICH SERVES A DUAL PURPOSE

REVOLVING STOP — Used as a stop, the new Alco Revolving Stop prevents abuse of the work ordinarily caused by roughness, imperfections or chips which accumulate on a stationary stop. The disc in the Alco Stop revolves concentrically with the work with the concentric action quickly adjustable by the floating alignment feature of the tool. Oil will not splash when the work contacts the stop because the revolving disc is below the outside casing.

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Eliminates chatter marks caused by vibration . . . No friction between the stop and the work . . . Increased feeds on forming . . . Rigid support on long pieces.

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NEW PRODUCTS

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TAPPING MACHINE

Here are the reasons why inexperienced operators — girls or men — can turn out occurate tapping at high production rates on this machine.



Photo courtesy of Lucas Screw Products, Inc.

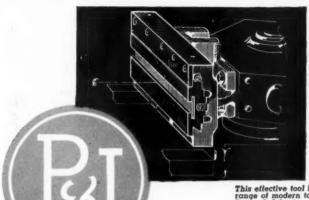
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This effective tool is one of a broad range of modern tools available for Potter & Johnston Automatics.

STANDARD MORIZONTAL SLIDE TOOL

This Horizontal Slide Tool provides a mounting for several cutter blocks to hold facing blades. The T-slot slide holding the blocks, is fed by a pusher attached to the Cross Slide either at the rear or front, as required. This Tool may be used for carrying forming cutters, internal grooving blades, or for straddle hub facing. The T-slot is on center with the shank in the Turret hole.

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Automatic Machine Tools

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The Magna Sine provides the fastest and most accurate way of making both single and double angle angular grinding set-ups. It employs the sine block method of determining the angle, the most accurate method known. The part is held firmly, but without distortion, at the turn of a switch. The Magna Sine is sturdily built to precision limits and will provide years of trouble free service. Available in two sizes in

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Aircraft hydraulic systems require almost the ultimate in precision threading for pipe connections. As higher and higher line pressures are used, the more important the joints become. Any slightest play in fittings is multiplied to dangerous proportions by vibration and flexing of lines. Imperfectly mated threads permit a tiny spiral of oil to follow the lead and form leaks. Mechanics trying to stop leaks tighten threads beyond designed limits and spread or swell the boss of the connection and increase the inaccuracy.

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USED THE WORLD **OVER**

SPECIFICATIONS:

Drills to the center of circle on base or table

Drills to the center of circle on base or Length of arm Greatest distance from spindle to base Minimum distance from spindle to base Minimum distance from spindle to column Traverse of spindle Hole in spindle—Morse Taper Diameter of spindle at nose Traverse of head on arm Traverse of arm on column Spindle speeds with 1200 RPM motor

Spindle speeds with 1800 RPM meter

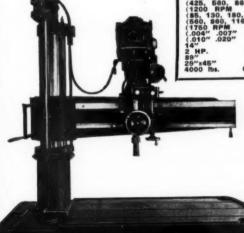
Feeds per revolution of spindle

Bearing of arm on column Size of main driving motor Height of drill column over geal Working Surface of Base Not weight

9" Column

3' Arm	4' Arm	5' Arm			
734"	96"	120"			
3'	4'	6"			
431"	48"	46"			
91"	15"	17"			
104"	10"	10"			
91"	94"	94"			
No. 4	No. 4	No. 4			
25 3"	901"	491"			
211"	24"	22"			
(60, 85, 13	0. 180.	on all medals			
(60, 85, 13 (425, 560,	860.				
(1200 RPN	•				
(85, 130, 1	180, 274,	on all models			
(560, 860,	1160,				
(1750 RPM	***	on all modules			
(.004" .007	100	on all models			
14"	18"	48"			
2 HP.	2 HP.	2 HP.			
89"	98"	98"			
29"x45"	36"x60"	36"x88"			
4000 lbs.	6200 lbs.	7000 lbs.			

11" Column 11" Column



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This quick-acting, sure-gripping Milling and Drilling Machine Vise gets work into and out of your machines swiftly. The knurled collar and screw provides jaw adjustment; then a short pull on the handle, in either direction to center, grips the work with pressures up to two tons by means of the cam action. Release is fast and easy. Available in 4, 5, and 6 inch sizes with or without swivel. Write for catalog giving prices and dimensions.

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THREAD rinding. BE DRESSER'S THE THING!

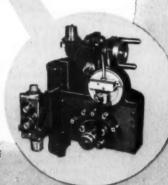
AUTOMATIC DRESSING IS PROVIDED IN THIS New DALZEN Electronic THREAD GRINDER

 Accuracy of a ground thread depends upon the accuracy of the dressed wheel. Precision, finish and production efficiency in thread grinding are deter-

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DETROIT (5), MICH.



Greater power combined with speed gives you faster, better per-

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Ther combines balanced motor design with lightweight construction to provide this greater power and faster, easier handling.

The Thor motor, producing true, smooth-running power because it is balanced both statically and dynamically as a complete assembly, is ruggedly built to stand up...longer, under the toughest operations.

Thor housings of strongly reinforced aluminum alloys and, in late drill models, of durable "Thorite" plastic, are compactly built to reduce weight to an absolute minimum without sacrifice of motor size and capacity, providing the light weight and handling ease that adds speed to power to get jobs done faster.

Write today for more details of the complete line of Thor Portable Electric drills, screw-drivers, nut setters, tappers, grinders, sanders, polishers, hammers, nibblers, saws and bench grinders in Catalogs No. 38.



Portable Electric Tools

INDEPENDENT PNEUMATIC TOOL COMPANY



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Hackmaster

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MULTIPLE CARRIAGE STOP

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- Accurately Gauges Length of Cuts
- Prevents Errors and Rejections
- · Any One of 6 Stops Available
- Stops are Numbered and Indexed

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AMERICAN MODEL DS-1

MULTIPLE CROSS SLIDE STOP

- Sets 6 Diameter Stops for Repeat Operations
- Prevents Spoiled Work
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- Makes It Unnecessary to Work by Dial Graduations

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All necessary parts are supplied with each Multiple Cross Slide Stop. Immediate shipment from stock. Rush order and priority today.

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With Wet-Belt Surfacing, solid areas, flanges, bosses, interrupted sections, can be surfaced with one application to the belt — freehand or with simple jigs — eliminating the distortion that often results from clamping. Effective coolants do away with frictional heat, distortion, cracking, discoloring, flow.



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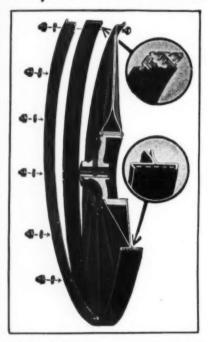
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- · The perfect balance and accurate machining of these super-speed wheels, assures improved opera-tion, and an ability to take terrific loads for long sustained periods.
- · Carter demountable tires are mechanically molded rubber, entirely covering an endless, perforated, flatsteel back-bone. Marvelous wearability!

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All accomplished by using

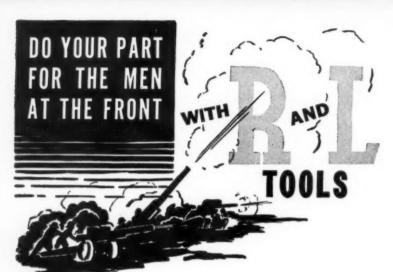
CARTER **Rigid Band Saw** WHEELS and Quick Change TIRES

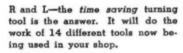
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Band Saw WHEELS . TIRES . GUIDES . GUIDE LIGHTS







It can be changed from right to left or left to right in 10 seconds. The only tool on the market of its kind.

No wasted time in set-up; performs many operations at once, such as: turning shoulder concentric with

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TRY a TRU-LINE Engineered Diamond Tool and you'll learn first hand why production men everywhere are turning to TRU-LINE. For TRU-LINE Diamond Tools engineered to your job will give you all these savings in time and money:

YOU'LL SAVE because the TRU-LINE multiple diamond tool requires no turning. That means less machine down time—greater production.

YOU'LL SAVE because of the unique feature of placing the diamonds in over-

WHEEL TRUEING TOOL COMPANY

3200 W. DAVISON AVE. DETROIT 6, MICHIGAN lapping rows. This provides a continuous cutting surface for the life of the tool.

YOU'LL SAVE because the thin blade that dissipates heat rapidly is made of our own alloy that forms a rugged, chemical bond with the diamonds, thus permitting the diamonds to be used up entirely.

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There is a TRU-LINE Tool for every type of straight, profile or step dressing operation—one that will bring to your job faster production, greater accuracy and remarkable savings in wheel dressing costs. Try one TODAY!

HAVE YOU RECEIVED A COPY OF THE TRU-LINE BOOK?

It gives complete details, illustrations and prices of this complete line of money-saving diamond wheel dressing tools, Write for your free copy today.



FEATURED in this Issue

COLORS are significant. They can be used to convey important messages and warnings. Adoption of Dupont's Color Code for Industry would assure color standardization — that the same colors would convey the same warnings universally. See page. 129

TRENDS in the Use of Carbide Dies for Press Work and in the use of Carbide Cutting Tools are discussed from several standpoints. Carbide Tooling is, to a great extent, responsible for our war production miracle. Postwar uses of carbides are forecast in the stories commencing on page155

LET'S TALK SHOP has been expanded this month to include a greater number of subjects, over a much wider range. This section commences on page.....231

MECHANICS THRU THE AGES 428

HOW LONG WILL YOUR COOLANT STAY "FRESH"?



"FRESH" coolant is free from foul sewage odor—does not separate—helps realize the full speed of production. How long your coolant stays that way depends upon your keeping it sterile. And sterility usually depends upon using a germicide "tailored to fit" your particular shop conditions. Not "just any disinfectant." Remember that many general disinfectants, though powerful, cannot kill bacteria in coolonts.

How to determine the right germicide for your coolant? By subjecting it to competent laboratory examination. The Dolge Laboratories will examine your coolant gratis—send you a complete, confidential report, starting with the bacteria count.

If sanitation is indicated, Dolge will recommend a Steried1 coolant germicide, GUARANTEED to maintain practical sterility, without affecting performance. Cost: never more than a fraction of one cent per gallon of coolant. And you get your investment back with interest.

Your Dolge Service Man is prepared to take samples of your coolant. Let him do so next time he calls. Free booklet (No. S-5) on request.

THE C. B. DOLGE CO. WESTPORT, CONNECTICUT

SOUTH BEND LATHES

GIVE SKILLED MANPOWER MORE PRODUCING POWER

To give our fighting forces the increased striking power of more and better weapons, Industry's skilled manpower must have

the increased producing power of fast, accurate tools.

South Bend Lathes squarely meet this requirement. Their rigidity and wide range of spindle speeds permit taking full advantage of the higher cutting speeds of carbide and diamond tipped tools. Their precision makes it possible to finish turn and bore with such accuracy that subsequent grinding and honing operations can often be eliminated.

South Bend Engine Lathes and Toolroom Lathes are made in 5 sizes—9" to 16" swings. The Turret Lathes are made in 2 sizes. Write for catalog. South Bend Lathe Works, South Bend, Indiana.





as. The Editor Sees. It



ECENTLY, there have been cut-backs, shifts, changes and cancellations in war production.

In some cases these actions have reflected shifting needs at the battle fronts. Again they have meant

over-production on certain items.

Some workers, without an over-all picture of just what has been happening, have been inclined to develop feelings of complacency . . . inferring that because of cancellations in near-by plants, Victory is "in the bag".

A plea from Lt. Gen. Somervell emphasizes that the war is far from won. In fact, we are now entering the most critical phase. Any slowing up of effort on battle lines or production lines, not only will prolong the conflict and increase our casualties, but might end in catastrophe.

What is true of the soldiers in the fighting lines is just as true of the workers in the supply lines. The workers' responsibilities are just as great. Their duty is to keep everlastingly at the job for which they

have been trained.

Workers and soldiers together, faithfully sticking to their tasks, unselfishly giving the best they have, and all they have of skill and experience, courage and "know-how", can shorten the conflict and insure victory. Anything less than all-out effort is not enough to win this all-out war.

Wesley G. Paulson

WARNING

to All Steel Users

Avoid Dangers of High Inventories

Here are the facts . . . Many companies in the metal-working industries have recently experienced cutbacks in war contracts and there is some evidence of planning for partial reconversion to commercial production. As a result, a number of manufacturers are already circulating lists of odd steel stocks and excess inventories. More lists will appear as cancellations, design changes and manufacturing trends follow the tide of war.

While there is no real surplus of steel at the present time, there are sound reasons for a conservative buying policy. First, you will help war production by making steel available to those who need it immediately. Second, it is good business to keep your inventory at a practical working level.

Steel overstocks may be dynamite. Cancellation of a contract or a change in design can overnight leave you with an excessive or obsolete steel inventory. There was a time when this conservative inventory policy might not have been sound from a production standpoint. However — most warehouse stocks have been built up so they now can quickly meet any demand. Ryerson is particularly well suited to serve your day to day or emergency steel requirements. Large and complete stocks on hand for immediate shipment provide a safe, dependable source for every steel need.

PARTIAL LIST OF STEELS IN STOCK

Bors

Sheets Structurals **Shapes Tubing** Carbon Steels

Tool Steel Allegheny Stainless

RYERSON

Joseph T. Ryerson & Son, Inc., Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Pittsburgh, Philadelphia, Jersey City

COLOR CODE

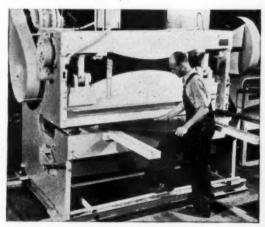
W HAT would happen if an announcewere made tomorrow that all Safety Councils were to be disbanded—all organized safety and accident prevention work stopped in all plants, and all study and research on safety problems discontinued?

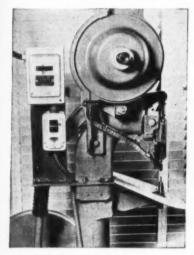
Assuming there might be some good reason for putting the responsibility for preventing accidents back in the hands of individual workers, just what reaction could we expect from such a move?

It has tickled my fancy and imagination to play with the idea. I can picture the roar of protest arising. Professors of economics and students of social science would weep on the shoulders of shop foremen and efficiency experts. Employers and employees, students and John Q. Public for once would find a common denominator in their widely divergent views. They would insist, I am sure, that the work of the Safety Councils must, under no consideration, be abandoned. In fact, out of the turmoil, would probably come a demand that accident prevention work be immediately expanded instead of abandoned. I feel sure that the entire industrial world would find its heart growing very much fonder of Accident Prevention if there were any danger of losing the fine work now being done by

*Director, Trade & Refinish Sales Fabrics' Finishes Dept., E. I. Du Pont de Nemours & Co., Inc. Wilmington, 98, Del.

Psychologically, orange is the best attention-getting color. It therefore bears the burden of shouting "danger" to operators of machines like these power shears. All equipment offering risk of cutting, crushing or otherwise injuring workers, should bear the Alert Orange signal, used in the shape of a triangle or arrow, wherever these symbols may be applied to advantage.





Just consider the color used almost exclusively in the painting of machinery. It is widely known as "Machine Tool Gray." Was this dark color responsible for some otherwise preventable accidents? Let me answer this question by referring to a



the Safety Councils and the many individuals specializing in this work,

Now, just what has paint to do with accident prevention? It may sound a little far-fetched, but paint actually has helped to reduce personal injuries in many plants and will continue to do so even more effectively in the future.



(upper left) Starting switches should be painted Precaution Blue. Operators thus receive a color message which says — Before starting machine, be sure it is cleared for action.

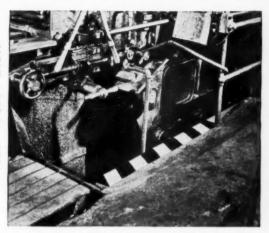
(upper right) There's no excuse for bumping into these obstructions. Yellow bands are visible at greater distance than any other color in the spectrum.

(left) Alert Orange also serves functionally to advantage when painted on the insides of removable machine guards, It calls attention to the fact that protective equipment has been removed and that an extreme hazard exists until guard is replaced. Note Orange stripe on exposed gear.

(right) This unguarded, open pit presents an excellent opportunity for High Visibility Yellow to play the warning role assigned it in the Color Code.

(lower left and right) The diagonal aisle obstruction belongs with dead-ends, low beams, trucking equipment, hoist blocks, edges of pits, etc.

All of these should be strongly designated with the High Visibility Yellow striping which shrieks—"Beware", "Be Careful", "Watch Your Step", "Danger", etc.

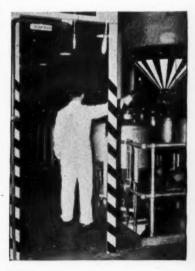




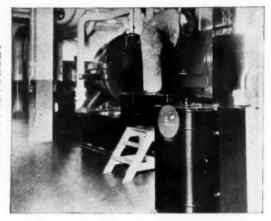
much lighter gray—Horizon Gray and Spotlight Buff. Will this new lighter color of gray, plus the added contrast color contribute to accident prevention?

The answer is that machines painted

with the lighter gray—Horizon Gray and with the working surfaces treated with a lighter color which will be in contrast with the material worked upon has, does and will reduce the number of accidents.



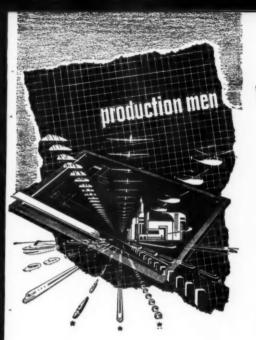
"Do Not Operate" Precaution Blue discs are borrowed from st an dard railroad usage. This message should be interpreted as meaning also—"Under Repair", "Condemned", "Unsafe", or in general "Leave Strictly Alone". The blue disc warning should be hung on elavators, tools, ladders, control valves, crates, scaffolding, and other equipment under repair, which should not be handled by unathorized personnel.



In support of this I could quote from many letters, but a few will suffice. A plant in the southwest reports:—"Our payroll has greatly increased, but during this period of rapid expansion with new, untrained help, machine operating accidents decreased 20%."

A Buffalo plant concedes a 40% decrease in the number of personal injuries since adoption of the program.





must shape the peace, too



Can you recall when America's war needs in terms of "ships, planes, guns and tanks" were broadcast to the nation? There were those of us then who said it couldn't be done. Impossible! Fantastic!

Comes the peace and there will be those who will say: "It can't be done. We can't provide enough jobs. We can't keep all these wheels turning. The nation's productive capacity far exceeds all con-ceivable needs for the post war period."

The short-sighted won't see that world markets are but 60 hours — by air — from their shipping room door . . . who think it utopian that much better and much more can be made for far less . . . whose war production at any cost, to-day, blacks-out the need to blueprint "peacework" product production — and mass selling — at lowest cost, tomorrow.

Better tools will shape the improved prodbetter tools will mape the improved prod-ucts of peace, just as better ordinance will have sped the Victory. Better LeBlond Lathes are available, now. They turn at a profit as they true your product. For your "peace-work" turning equipment, turn to LeBlond.

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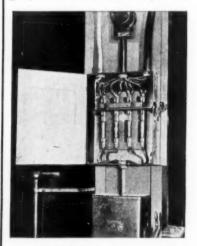


Direction markings guide traffic around obstructions, to avoid collisions.

An Eastern plant writes:-"In the one shop in which all the machines have received the paint treatment, there was only one lost-time accident in the year following the paint job."

A mid-western plant asserts:-"Personal injuries have decreased 50% since adoption of 'Three-Dimensional Seeing.' "

Aside from preventing suffering and grief, here's one effective step toward



Alert Orange should be used on the inside of fuse or switch boxes, which should be kept closed for safety.

lists new tools. Latest prices. WRITE TODAY for

Shobet OTARY FILES

Hand Cut and Ground Cut ROTARY FILES

examplete line of high speed steel tary Files for every industrial pures. Noted for their rugged service-lity under all conditions. Send for fusely illustrated Catalog R.

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IMPORTERS OF GROBET SWISS FILES

New York 13, N.Y.

May, 1944

MACHINE TOOL BLUE BOOK

solution of the critical manpower shortage—eliminating accidents that don't have to happen.

This program of painting machinery in safe colors is called "Three-Dimensional Seeing." It has already been adopted as standard painting practice for machinery in over 1,000 plants including many important representative firms.

I hope I have now established the point as to whether or not paint can be used to prevent accidents. There are many other factors entering into the fight against accidents. It is my conviction tho, that paint. scientifically selected, can and does, improve seeing and working conditions, and by lessening eye fatigue and bettering morale, it contributes beyond all question to the reduction of industrial injuries.

Frankly, the Dupont Company was elated over the success of the "Three-Dimensional Seeing" program. Naturally, they felt the need for a more thoro exploration of the field of Accident Prevention to see if there were other ways in which paint could be of help in promoting safety. It is believed they have

found this in the proposed new Safety Color Code for Industry.



Safety Green symbol on the wall identifies location of first aid equipment.



QUESTION: HOW CAN I ESTIMATE TAPPING COSTS MORE ACCURATELY?

ANSWER:
(LEAD SCREW [)
TAPPING MAKES
JOB ESTIMATES
EASY!

CLEVELAND (100 Senior) TAPPING MACHINES Eliminate Lost Motion In Production Schedules

Our customers find that time and cost estimates are greatly simplified by elimination of the human element

in production tapping. Several of them also report production increases up to 300% since changing to Cleveland Lead Screw Tapping Machines. Want to know more about it? Write for details.

"Guide for Production Tapping" is full of valuable data. Write Now!



CLEVELAND

TAPPING MACHIN * COMPANY *



STRONG - ACCURATE - DURABLE

Brown & Sharpe Vises are made as low as possible to hold work close to the machine table.

A bearing the full width of the vise jaws gives solid support to withstand pressure of the cut... even at the extreme ends of the jaws.

The heavy screws are of a form and lead chosen particularly for the requirements of each type of vise.

The complete line of Brown & Sharpe Vises includes styles for practically every machine shop requirement. Circular showing complete listing sent upon request.

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ADJUSTABLE
ADJUSTABLE SWIVEL

PLAIN

BS PROWN & SHARPE MEG. CO.

BROWN & SHARPE

Let's consider some of the background thinking behind this program.

First of all, color can be used as a language to transmit ideas. It has been so used in the past and is being so used today. Black naturally suggests death and mourning. White means purity. Red denotes blood, danger and, strangely enough, courage. Colors are used to designate the various castes of India. For years purple was the exclusive color of royalty.

Every day we make use of the fact that color "speaks" a message to our minds. A red traffic light says "stop" almost as

emphatically as a six-foot policeman. Green says "go" and yellow says "wait" just as plainly as the spoken words themselves.

The railroad industry has long recognized the language of color and the Ass'n of American Railroads in its "Standard Code of Operating Rules" has seen to it that each color says the same thing all over the country. In railroad circles, blue, for instance, says:—"Don't move this object—men working on or around it".

School buses are painted a standard yellow, National School Bus Chrome—a color established by the U. S. Bureau of Standards. As you drive along in the morning and see that bright yellow bus coming towards you, the thought of "school kids" registers in your mind.

Even the Interstate Commerce Commission uses color. Labels of different colors warn handlers and shippers when they are handling explosives, inflam-

mables, acids, etc.

The standardized system of colors for piping identification is familiar. It is amazing to see a mechanic in an industrial plant look at a perfect maze of pipes overhead and tell the contents of each by "reading" the colors used on various pipes.

The Army and Navy both use the language of color so their men can quickly pick the types of shells they want to use. There are separate colors to identify shells which are armor piercing, inflam-

mable, shrapnel, smoke, etc.

In a number of ways, industry has already recognized that color has a language, and in a number of ways industry is making color speak the sentences it wants spoken. Now how does this apply to the National Safety program?







A sensational Kennametal achievement—the KENNAMILL—can give new life to your milling machines . . . adapting them for the high speed milling of steel that is inherent in modern, negative rake carbide cutters. At the same time, the Kennamill can improve the quality of your work by producing finished surfaces that are excep-tionally smooth and accurate.

Kennamills are inserted-blade cutters availspindles, as listed below. All sizes use the same 5%" square, 10° negative back rake Kennametal-tipped blade (Cat. No. 39M40) Two sets of blades are supplied with each cutter head.

The low initial cost of Kennamills is combined with economy of blade maintenance. No expensive grinding equipment is needed—the blades are easily removed from the cutter head and resharpened to a template on a simple adjustable table carbide grinder. Accurate resetting in the head is not necessary since each blade cuts an independent path.

The use of Kennamills assures optimum machine performance. The sturdiness of the cutter body, plus distribution of the work over the keen-cutting Kennametal-tipped blades, minimizes vibration and chatter, smoothes out the load, and fully utilizes available horsepower, with feeds up to 21" per minute.

Kennamills are available for immediate dekennamilis are available for immediate de-livery. They are stocked at our factory, and at Kennametal offices in Atlanta, Chicago, Detroit, Houston, Los Angeles, Philadelphia, New York, and San Francisco. Get in tune with the fastmoving tempo of carbide steel milling-order Kennamills today

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Size	Fits Spindle	No. of Blades to Cutter	Price East
2"-40	# 49	3	531.91
2"-50	# 50	3	35.41
3"-40	# 49	4	29.99
3"-50	# 58	4	41.22
4"-50	# 58		43.04
3"-50	¥38		44.85
	Extra Blade	m (No. 20040) each \$1.8	5

Templates-for regrinding blades-each \$1.75





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ATTACHMENTS— To clean everything in the plant.

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ELECTRIC MFG. CO. 5118 N. Ravenswood Ave. Chicago 40, Illinois





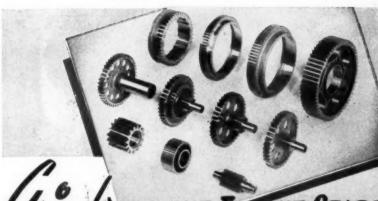
During the past several years, our men have surveyed a number of plants for "Three-Dimensional Seeing" on behalf of our Color Conditioning in Industry Program. Keeping our eyes open for ways and means of making paint more useful, our men found that color was not being used to its fullest advantage to supplement safety and accident prevention programs. In fact, many plants did not attempt to use paint to shout safety messages to employees. Some plants used paint in only a limited way to warn of hazards, etc. But worst of all, it was found that the confusion of tongues which ended the building of the Tower of Babel was nothing compared to the confusion twice-confounded as a result of the misuse of color in attempting to convey safety messages.



Red stripes or bands on pillars, posts or walls identify fire protection equipment.

Let me illustrate. We found fire doors in the same plant painted red, yellow, green and white. In other plants the fire doors were painted the same color as the walls.

Safety showers—where workers in an acid plant were supposed to douse themselves if splashed with the acid—were painted red.



The internal aircraft engine gears shown here were ground on the new Fitchburg Gear Grinder. As a result Fitchburg has been commended, right down to the operator of the machine, by a leading aircraft engine manufacturer—on the dimensional accuracy and finer finish obtained. These jobs were also performed in less

Similar results on a variety of work can be obtained on this machine—with the same quality and high production. Let Fitchburg engineers show you how. Prepare now to meet peace-time needs with greater production at low cost.

grinding time than was possible before.

ENGINE GEARS
LIKE THESE ON A
FITCHBURG



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Manufacturers of - Bungage Wheelhood Unite Multiple Precision Granding Unite Spline Granders

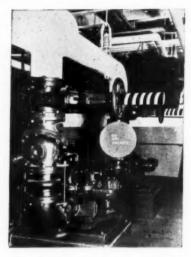
In the same plant the same color would be used for as many as five different purposes. One employer had the corners of stairways painted red to stop employees from depositing their tobacco cuds in these spots. Many, many hazards which could have been spotlighted and brought forcibly to the attention of the workers were not painted at all.

Faber Birren, the well-known industrial color consultant, who has been retained by the Du Pont Company to work on this and similar industrial paint problems,

sums it up in this way:-

"There are definite hazards in every plant. Also there are safety devices in every plant. Color (in the form of paint) should be used to spotlight and identify these potential troublemakers, as well as to help in the speedy location of safety and fire protection devices. The use of color is not enough. The right color should be selected for each job. More important, these colors and their uses should be standardized, not only in every part of every plant, but also in every plant thruout the country."

With the assistance of Harold L. Miner, Manager of the Du Pont Safety and Fire



Precaution Blue again signifies—"Do Not Touch". Orange stripes on valve stems shout a warning against collisions.





STAR OF THE SHOW!

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The Aero Self-Indexed Bed Turret has six tool stations and six individual stops that index with the turret. Precision finished. Hand-scraped ways. Pre-loaded Timken bearing head.

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A production tool, smooth in operation, engineered to fill a broad field where a fast bench neered to hit a broad need where a last select unit can be used most advantageously. It saves time by taking the part to be machined to the grinder instead of taking the grinder to the part as in the case of a portable tool. It leaves the operator with both hands free with which to handle the work; the result, much more production. 3 stages of power.

WRITE FOR LITERATURE.

130-134 E. LARNED ST.

DETROIT 26, MICHIGAN

Protection Div., and Mr. Birren, we have evolved what we refer to as the DuPont Safety Color Code for Industry. This proposes a uniform system of color signals-a system based on sound scientific facts and research. It establishes as suggested standards, certain colors to indicate accident hazards, identify protective equipment and assure orderly arrangement and good housekeeping.



The white wall and green crosses make this stretcher case visible from a distance.

Six colors have been selected as industrial Safety Code Colors. They are:-Yellow, Orange, Green, Red, Blue, White (and black or gray).

High Visibility Yellow, as we have named the particular yellow chosen, was selected for just that quality of being visible at long distances and under rather poor lighting conditions. Incidentally, this is the same color as the standard for school buses mentioned previously. It is also used by the Navy on life rafts and life jackets of aviators.

INCREASE MILLING PRODUCTION without Added Men or Machines!



Sefere After Aluminum Parts

These aluminum parts were milled upon the Aerce Multi-Grip Chuck at the rate of 355 per hour (floor to floor) as compared with single milling operations of only 71 per





Sefere After Chrome Steel Parts

These parts, high heat treated of Chrome-maly, were produced at the rate of 62 per hour (floor to floor) on the Aerca Multi-Grip Chack. Individual milling time was 15 per hour.

These parts milled with the use of the Aarco Multi-Grip Chuck show its variatility.

with the HERCO HYDRAULIC MULTI-GRIP CHUCK

Two rows of collets hold ten parts and both rows are milled simultaneously and with but a single loading increasing production as much as 500%.

Self-centering aligning collets insure perfect on-center milling regardless of slight shank diameter variations. Safety stop prevents damage to collets should all stations not be loaded.

Aerco Multi-Grip chucks may be used for both vertical and horizontal milling. Work is held rigidly in collets and cannot turn or be pulled out during milling operation, however clamping pressure is instantly releasable and self-opening collets can be quickly re-loaded

Collet sizes range from ½" to 1¼" and are available in round, square or bexagon shapes.

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MANUFACTURED EXCLUSIVELY BY

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WRITE FOR NEW FOLDER

High Visibility Yellow is used on trucking equipment; aisle markings around hazards; edges of loading platforms and pits; railings; floor pan edges; conveyor parts at hazardous levels; aisle obstructions; protruding parts; curbings; dead ends; low beams; stairway approaches; floor elevation changes; chain hoist blocks; loading buckets, and risers of off-standard steps.

This orange is the loudest, "shoutingest" color in the whole deck. It has been christened "Alert Orange" and on this

color rests the biggest burden.

Alert Orange should be applied to the interior surfaces of electrical switch boxes; fuse boxes; power boxes; machinery guards; pulleys; gears; cutting devices and rollers.

The next color is traditionally associated with Safety. It is the color recognized by your own Safety Councils. It is used on physicians' emblems, on cars and is widely used by both Army and Navy for Safety equipment. We call it "Safety Green". It is employed to identify first aid rooms; stretchers; cabinets for medicinal sup-

plies; respirators and gas masks, and for safety showers. There is no need to explain the background or use of this particular color.

Fire-Protection Red should be used for fire extinguishers; hose connections; apparatus; alarm stations; fire hose; hydrants; fire doors and fire blankets.

From the railroads we have borrowed the blue symbol for machinery not to be moved.

Precaution Blue should be used to identify equipment or apparatus not to be used, moved or started, such as:—ovens, electrical controls, valves, vaults, dryers, scaffolding, vats, boilers, compressors, kilns, and tanks.

Traffic White (Gray or Black) should be used to designate traffic controls, storage areas, waste receptacles, aisle markings, corners, floor areas immediately surrounding waste receptacles, etc.

Symbols or designs are used with each color whenever reasonable. The triangle or arrow with orange, the cross with the green, the square with the red, the disc

RENEWED or NEW SURFACE PLATES



Swanson Seasoned Surface Plates are made in 24 standard sizes to 36"x 60" —special sizes to order. Wood covers and handles included with each plate. e SWANSON Seasoned Surface Plates are available in 24 standard sizes and special sizes to order. However, we can make your old Surface Plate like new again, or if it is too worn to be reconditioned, we'll make a good allowance for it towards a new Swanson Plate. Just write us before you send your old plates. Our principal business is precision machining and toolmaking, so we know the value of an accurate Surface Plate. Write for instructions and price list.

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Involute Inspection IS THE KEYSTONE OF PRECISION GEAR MANUFACTURING



Fellows Involute Measuring Machine

Which brings us to the fact that a Fellows Involute Measuring Machine is not only simple to operate, but is flexible in application, and a sound investment that pays dividends in the production losses which it prevents.

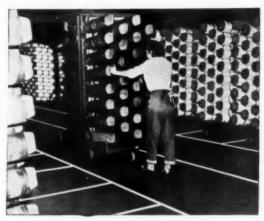
Every shop, large or small, that is turning out precision gears in quantity should investigate the advantages of this machine.

Write us for the descriptive bulletin on Fellows Involute Measuring Machines.

THE FELLOWS GEAR SHAPER

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Traffic White (or Gray or Black) marks traffic lanes, aisles and storage spaces. Where the aisle mark is adjacent to a hazard, yellow should be used instead of white.



with the blue, and yellow and black alternate striping.

Statistics indicate that about 4% of all males are color blind. In most cases these

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and climinate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

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people cannot distinguish between red and green. In many instances to such people, these two colors look alike and appear dull, brownish or gray. That is one important reason for the use of symbols as well as color. The color blind may not recognize the color but they can learn the meaning of the symbols. A further purpose is to make use of two impacts to get across the safety message—let the color shout the story, but that shout can be amplified if design, shape or symbol is associated with that color and repeats or emphasizes the same warning.

Traffic White in the Safety Color Code marks aisles, storage spaces, and rubbish containers. For traffic control, the rule is to use white on dark floors; but black on light floors. Where the aisle mark is next to a hazard, High-Visibility Yellow is





NOW Offers NEW AND IMPROVED TANGENT CHASER SELF OPENING DIE HEADS!

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Is a monothing Dis Hond built to be used on any smothing to be used on any smothing Dis Hond to be used on more than Dis Hond to be used on meahings.

MANUFACTURED of Special Alloy Steel, hardened and ground throughout, these Die Heads (Model "T" series) are expressly made to cut accurate threads on long production runs. They are designed to use Tangent Chasers—giving long chaser life; permanent throat; uniformity of finished work throughout the entire life of chasers and interchangeability of chasers.

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Also ask for literature on Collapsible Machine Tap; Self Opening Die Heads; Thread Milling Machines, Tapping Machines and Roller Pipe Cutting-off Machines.

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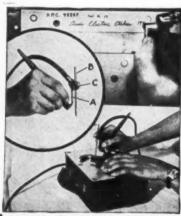
MURCHEY

better than Traffic White. Gray is the practical color for waste receptacles, although the method white emphasizes cleanliness and encourages good housekeeping. Painting of wall and floor areas adjacent to waste receptacles discourages littering. The 5-pointed starry symbol painted on the wall above receptacles emphasizes their purpose and reminds employees to discard refuse in these containers.

Many companies today use colors to mark piping. At conspicuous places thruout the piping systems, color bands on the

BREMIL MFG. COMPANY
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ALL-ALLOY compound lever strap
cutter. Cuts 11/4
strap with one
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ANNIS ELECTRIC ETCHERS

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with the stylus that stays cool

R. B. ANNIS CO.

R. B. ANNIS CO. INDIANAPOLIS 2, IND. pipes designate contents. If desired, the entire length of the piping system may be painted in an overall color.

Further, actual contents of a piping system may be indicated by a stenciled legend giving names of contents in full or abbreviated form. These legends are placed on the colored bands. The identification scheme may be extended by the use of colored strips placed at the edeges of the colored bands. The bands, legends and stripes should be placed at intervals thruout the piping system, preferably adjacent to valves and fittings, to insure ready recognition during operation, repairs and times of emergency.

Red is used for fire protection equipment and sprinkler systems; yellow or orange for dangerous materials (acids, gases, steam, etc.); green (or white, black, gray or aluminum) denotes safety materials such as drinking water, brines, compressed air, steam below 212 degrees F., etc.

Fright blue indicates protective materials and deep purple commonly means extra valuable materials.

Three-Dimensional Seeing calls for painting machinery in colors that reflect light instead of absorbing it. Thus, better seeing conditions are provided because the usable light at the immediate working point is increased. When bodies of machines are painted in Horizon Gray and the working areas in a contrasting hue, Spotlight Buff or Green, these danger points are "spotlighted" clearly.

Walls, ceilings and floors are also painted in colors that are high in reflection value, thus making the entire plant interior lighting unit which salvages waste

An illustrated booklet giving complete details on the Safety Color Code for Industry is available on request to the Finishes Div., E. I. du Pont De Nemours & Co., Wilmington, 98, Del.

WINFIELD SMITH BOOKLET

An unusually interesting and colorful 24-page booklet, showing the important part speed reducers have been playing in many phases of the war production effort is offered by Winfield H. Smith, Inc., Springville, Eric Co., N. Y. It portrays the versatility and exceptionally broad application of these units. The folio, "WHS is Part of This Picture" will be sent on request.



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ARMOR



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COLLETS Assure ACCURATE

There's no pull-back off the stop when the Armor Collet Chuck closes, no slipping of hardest steel under pressure although the stock may be several thousandths outsize.

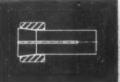
The best features of both conventional draw-in and push-out type collets are combined in the Armor Collet Chuck. It has two equal 15-degree tapers in the nose, the exclusive Wedge-Lock feature; permits no movement of the stock at any time. Losses on rejects for inaccurate lengths turn into profits when the Armor Collet Chuck goes to work.

Machined from solid bar steel, hardened and ground to .0002" in the nose, the Armor Collet Chuck is extremely durable, retains its accuracy under all the jamming and general mishandling green operators can give it. It fits all lathes with 1½"—8 thread spindles (larger sizes on order); handles stock up to ½" round. Armor Collets are available in round, hexagon and square. With adapters, the Chuck works perfectly with Allison, Barber-Coleman and Cleveland collets.

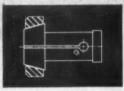
The Armor Collet Chuck turns with the spindle, has no internal ball-bearings or gears, runs cool, requires no lubrication of any kind, is easily handled. Only 30 seconds are required to change collets.

Produced by the builders of Armor Milling Machines, which are used the world over, the manufacturing cost of the Armor Collet Chuck is higher than the selling price of many other makes: Chuck, \$87.50; collets extra. Chucks, and round, hexagon and square Armor Collets, can be shipped immediately from stock. Aircraft Machinery Corporation, 214 West Orange Grove. Burbank. California.

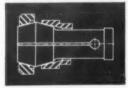
C O L L E T C H U C K S



DEAW-IN collet, in gripping stock as it closes, tends to pull stock away from stop several thousandths, often causing rejects.



PUSH-OUT collet, with one taper at nose, depends upon pressure to hold it against stationary nose of chuck. But greater longitudinal pressure sometimes exerted by drilling, etc., pushes the collet back off the nose, allowing stock to slip.



DRAW-PUSH COMBINATION, exclusive Armor Wedge-Lock feature, has two equal 15-degree tapers which wedge together with equalized draw-and-push pressure. (Do not confuse with collets having an extremely sharp hose taper which is used for centering only). As Armor Collet closes, stock is pushed against stop and firmly held there until Wedge-Locked. Guaranteed not to slip at any time.



ON THE PRODUCTION FRONT

THE USE OF CARBIDES FOR PRESS WORK

Interrupted by the war's outbreak and suspension of most commercial manufacturing, an important production development of great promise for postwar use is the application of carbides to processing sheet metal and other stamping and press operations.

Peculiarly enough, tho the war interrupted this development commercially, lessons learned in producing armament components since then have greatly advanced the art of using carbides for press work.

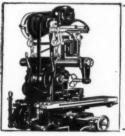
An outstanding illustration has been in forming cartridge and shell cases as well as shell themselves. Thus, carbide dies made possible a switch from brass to steel shell cases—a development which would have been impossible on a production basis without carbide dies.

Prime reason for the growing interest in using carbides for press work is this material's tremendously high abrasion resistance and consequent ability to hold close limits and maintain high finish over long runs. Altho true that carbides cannot be used everywhere and cannot always be used interchangeably with tool steel dies, the almost universal experience has been that die life has multiplied many times whenever carbides have been carefully applied in press operations. This applies equally to forming both ferrous and non-ferrous metals, as well as non-metallic materials including ceramics, medical compounds, and even organic materials.

A cursory survey of some little-known applications of carbide dies for press work already in effect prior to the war indicates both the further war-time and postwar possibilities in this field. While early uses of carbide inserts for press dies, punches, etc., can be found 10 years ago, real development by industry did not get under way until shortly before the war.

To illustrate design and application practice followed by industry in adapting carbides to press work, a number of commercial applications have been selected. Performance of each individual case has been investigated and the information is presented herewith.

Fig. 1-Drawing dies for manufacturing

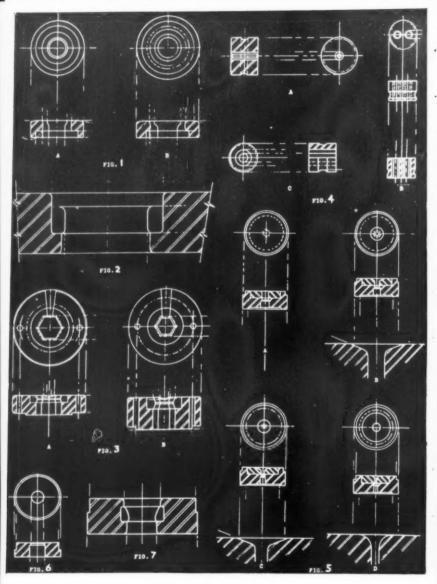


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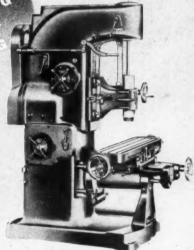
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This milling machine will perform and accurately produce to full capacity at all speeds and feeds. Here are some of the ways that the KNIGHT MILLER can save you valuable hours on many jobs. Equipped with a special swivel and tilting · table that saves the use of angle plates, cutters and special fixtures. The No. 40 has a wide range of capacity fitting it for many jobs and uses. There are 16 different spindle speeds and 16 different table feeds available.

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60 WALKER ST., NEW YORK, N.Y. 36 N. CLINTON, CHICAGO, ILL. lipstick tubes. Material is 0.016" brass; tube is formed in two operations in dies shown. Total amount of reduction is from one to %" diameter; production required around 10,000,000 such tubes. Dial presses are used, and die life is estimated as being approximately 50 times greater than when tool steel dies were used.

Fig. 2—A die for one of eight draws on automotive engine cylinder sleeves. Special automatic presses were used. With steel dies, an average of 2000 pieces were obtained between reconditioning. With carbide dies, 200,000 pieces were obtained.

Fig. 3—Dies used to burnish the flats and hold sharp corners of nuts which have been punched and sheared. Die holders had been designed for steel dies, so carbide dies were made interchangeable. Carbide dies have produced 100 times as many parts as former steel dies.

One manufacturer used punches and dies made of Carboloy cemented carbide for punching out slots in laminations for small motors. Recent die inspection showed an average burr height of only 0.006" after punching out 7,000,000 slots in silicon steel sheet, without grinding the dies. On this type of work, high speed steel dies will handle only about 100,000 slots per grind. Thus increased life of about 70 times was obtained.

Dies used for forming and compressing medicinal tablets—a relatively abrasive material—are shown in Fig. 4. Here, carbide dies showed an even greater increased life over high speed steel varieties. About 40 different sizes of such tablet dies are being used by manufacturers. The dies are used in combination with high speed steel punches.

Another company used round Carboloy cemented carbide die nibs with steel punches for punching out holes in highly abrasive asbestos shingles.

The four drawings in Fig. 5 show, in sequence, four carbide dies used for first, second, third, and fourth forming operations to shape the bottom of a ferrule as shown in the sketch at the top. The part is of nickel iron. Operations differ mainly as to die size and amount of draw or decrease in diameter as the end is formed. Large quantities of these parts are produced on eyelet machines. The present carbide dies have produced some 3.000.000

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Milwaukee Face Mill Grinder Milwaukee Midgetmill

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parts and are not yet worn out. According to the manufacturer, tool steel dies had practically no life at all because the die continually picked up metal and scored the work.

Fig. 6-A die used to clip the flange from a candelabra size lamp base. The base is of brass or steel, and an eyelet type machine is used. A carbide die life of only 10 to 15 times that of tool steel has been experienced here. The small increase is due to the fact that carbide dies fail-not from wearing out-but from failure due to accidental abuse of the die.

Under normal conditions, increased performance in the order of 50:1 could be expected from carbide dies on this application.

Tubes for thermostat bellows-usually of soft brass, bronze, or monel metalare produced with the dies shown in Fig. 7. Before the draw, the piece is shaped as shown at the top, right, in Fig. 7. The final shape of the bellows is shown directly below the sketch of the piece after the draw.

These carbide dies were designed to fit into holders originally made for steel dies.



132 CHARLES STREET,

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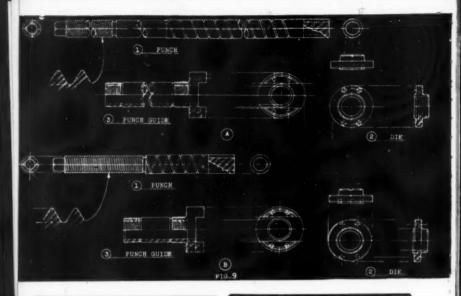
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Superior quality fully justifies the name of these files—Nicholson Superior. They can be used on cast iron, sheet steel and commercial annealed tool steel—as well as on aluminum, magnesium, babbitt, brass, lead and soft alloys; on plastics, hard rubber and wood. There are standard, fine and smooth cuts—for fast metal removal down to fine-finishing of white brass, phosphor bronze and sheet aluminum; for lathe, die, tool and other extra-smooth work.

Nicholson Superior Curved Tooth File as sures fast, accurate work

Besides the aircraft and motorvehicle industries, Nicholson Superior Curved Tooth Files find wide use in scores of other metal-working industries. There's the rigid tanged type—in flat, square, pillar and half-round cross sections. And there's the blade type—both rigid and flexible—for use in special holders; for flat, concave and convex surfaces; for bearings and for mouldings. Order through your mill-supply house. Special inquiries or problems will be given prompt and cheerful attention. Send for Catalog Sheet of available types and sizes.

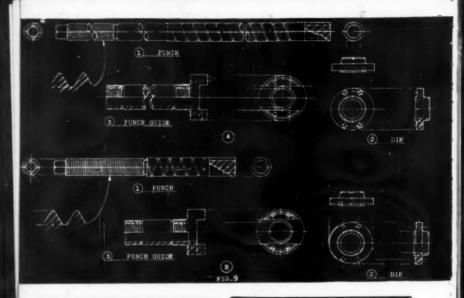
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Improved Type Holders for Hand or Press Use. Super Quality Steel Type for Stamping into Metal, etc.



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Superior quality fully justifies the name of these files—Nicholson Superior. They can be used on cast iron, sheet steel and commercial annealed tool steel—as well as on aluminum, magnesium, babbitt, brass, lead and soft alloys; on plastics, hard rubber and wood. There are standard, fine and smooth cuts—for fast metal removal down to fine-finishing of white brass, phosphor bronze and sheet aluminum; for lathe, die, tool and other extra-smooth work.

ing down a die to form a structural section. True-cui, "razor-sharp" Nicholson Superior Curved Tooth File assures fast, accurate work.

Besides the aircraft and motorvehicle industries, Nicholson Superior Curved Tooth Files find wide use in scores of other metal-working industries. There's the rigid tanged type—in flat, square, pillar and half-round cross sections. And there's the blade type—both rigid and flexible—for use in special holders; for flat, concave and convex surfaces; for bearings and for mouldings. Order through your mill-supply house. Special inquiries or problems will be given prompt and cheerful attention. Send for Catalog Sheet of available types and sizes.

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- Female for work not having centers

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which accounts for the deep case below the nib. The relatively light reduction involved permits a very shallow nib. Vertical crank presses and horizontal hydraulic presses are commonly used for this type of work, with dies either single or in tandem. Parts must be uniform in size; surfaces smooth; etc. Approximately 2,000,000 parts are run a year. Carbide dies show an average of about 100,000 parts compared with 10,000 parts for an equivalent set of steel dies (drawing is on report from Weiser).

Fig. 8 shows two eyelet type dies. At the left are the upper and lower dies for a tandem drawing operation. Materials drawn are brass, aluminum, and steel, altho recently steel has been used more extensively than the other two metals. Special multi-spindle presses of the manufacturer's own design are used, and millions of pieces are produced. Before the draw, the part is a round slug cut out by the dies shown at the left. The finished part is a shoe eyelet. The eyelet-forming dies are shown at the right. Here, the blanking punch could not be produced by shearing it with the carbide die. Accurate alignment was essential for blanking and special machinery was designed with guides to insure such alignment.

Fig. 9 shows carbide punches and dies for producing bottle caps. Inch round discs are punched from tin foil strips 0.0025 to 0.003" thick and stamped into the cork insert in metal bottle caps on an automatic machine. Approximately 280 caps are formed per minute. Before using carbide faced punches and die assemblies, tool steel punches and dies had to be ground at approximately 50 hour intervals. The total average life was 25 grinds. With carbide tools, life between grinds has been increased to an average of 1000 hours and a life between grinds of 2800 hours for punches and as long as 5000 hours total punch life has recently been obtained.

Fig. 10 shows dies for punching holes in highly abrasive 3/16" thick plaster board having a center of gypsum material with heavy paper on both sides. Punch and die are located in a special machine by an adjustment in the die holder. An accurate setup is required and the punch is separately produced instead of being

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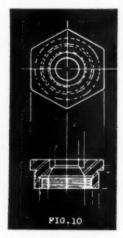
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shear-centered. About 0.002" clearance is allowed between punch and die on a side. Dies for this work are generally used until they are so dull the punch will not shear a clear hole and will begin to tear the paper. Since the operation is done under water, die cases are made of stainless steel to prevent rusting. At times, punches with carbide ends also have been used for this work. If this is done, however, it is essential that the alignment be extremely accurate and the dies, etc., well supported to prevent the possibility of breaking up the dies with the hard carbide punches. Die life for this type of work was approximately 20 times greater with carbide inserts than it was even with chrome plated tool steel dies.

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ASPECTS OF CARBIDE TOOLING

THE Chicago Technical Societies under the auspices of the War Production Council set up a clearing house for the latest and best in technology and technique, March 30 at the Stevens Hotel. Dozens of panel meetings, excellently conducted and smartly administered, presented a review in cross-section of everything from Electronics to Management and Machine Shop Practice.

It was obvious to industrialists and production specialists attending the latter panel that Carbides are not only here to stay, but will raise American production miracles into new and higher brackets. We have had Carbide as a cutting metal since 1928. But its immediate limitations left wide sectors for the traditional cutting materials. Developments in powder metallurgy, however, as well as developments in Carbides themselves shortly extended the field from the irons to the steels. At first, in the form of single point tool work: then to fly cutting in typical milling operations, and lately to multitoothed cutters, not even excluding form cutters with which inevitable difficulties are often encountered, no matter what the cutting medium.

But Carbides are here to stay. The technique of using them is being improved and will raise their accomplishments into new production records. But the biggest advances will come, first, with improvement in brazing; second, in grinding. Brazing at best is an exacting technique, requiring patient and skilled execution. Much remains to be learned about brazing and when this has been done, Carbides will soread their usefulness.

Deep freezing of Carbide cutters, as noted before in these columns, holds definite possibilities for improvement in Carbide cutting results. Obviously, this cold treatment does not affect the material itself, which is beyond such influence because of its inherent structure, but it does materially affect brazing strains. When a Carbide blank is brazed to a bit or shank or body, the latter material shrinks approximately twice as much as the former. Thus the Carbide is stressed, unfortunately, in tension for which it is ill suited. Deep freezing relieves these

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There are some indications, (mentioned briefly at the Chicago meeting) that brazing eventually may be eliminated by substituting for it some form of mechanical application such as a wedge, a screw or a taper pin. Some of these have been successfully tried with definite indications of increased Carbide effectiveness. Cubic inch removal has been increased several times. This development is yet in the initial stages and much development work remains to be done.

Fortunately, the economics of Carbides fosters this tendency to the use of virgin Carbide blanks unbrazed and, therefore, unstressed. Where, in 1928, Carbide cost \$400 per pound, today it is selling for around \$15 per pound. Thus it is economically feasible to use solid blanks of this miracle metal.

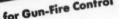
Grinding technique is in for a shakeup and numerous changes. Not so much in the technique itself as in abrasives which at the moment, in the form of diamond wheels, are relatively costly. Substitutes are coming and these will be as good, or better, and considerably lower in cost.

Grinding equipment, particularly for cutters (milling) needs improvement and development. Particularly in the form of radius grinding attachments or radius grinders which are so imperatively needed for Carbide milling of steel. This is specially true in the aircraft industry (airplane wing hinges) where no sharp corners are permissible for obvious engineering reasons. There are definite indications that these demands are and will be met by American ingenuity of design and manufacturing.

In this connection, it is surprising that enterprising individuals have not established centers for the servicing of Carbide tools—brazing and grinding. The small organization cannot well afford the investment for equipment for these techniques, not to say the time necessary to train the skilled personnel. The servicing of Carbide tools in every industrial community (brazing and griding) holds forth great possibilities as a remunerative service if established on the basis of results for the harassed customers.

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anish-turned. The 10 wells are arist rough mined to a depth of .052". Then a finish cut, with the same cutter and spindle speed, removes .010° stock, merely by lowering spindle the required ance, merely by an wering apinone the required amount. Hand finishing required is almost negliamount. mang minining requires is amost negar-gible—due to the excellent finish obtained by the use of 2-flute Tungsten Carbide form cutters—st





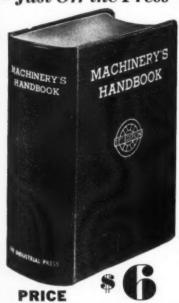


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1224 SANTA FE AVENUE LOS ANGELES 21, CALIF. This demand too, will no doubt be met by American resourcefulness and is one of the inevitable trends of the near future.

Also participating in the panel was H. W. Highriter, Chief Metallurgical Engineer, Vascaloy-Ramet Corp. He traced the Developments in Carbide Materials.

K. R. Beardslee, Vice-President in Charge of Sales, Carboloy Co., Inc., presented "A Sound Plan for Handling Carbides in Your Plant".

Dr. H. A. Frommelt, Director of Industrial Research, Kearney & Trecker, talked on "Milling With Carbides", and W. L. Kennicott, Tool Engineer, Kennametal, Inc. discoursed on "Roughing with Carbides."

The afternoon session of Machine Shop Practice presented, "Eliminating Operations by Fixture Design", by M. C. Taylor, Master Mechanic, Bastian-Blessing Co., "Jig and Fixture Design in Aircraft Industry", by G. H. Clement, Supervisor of Tool Design, Douglas Aircraft Co. Inc.; "Jig and Fixture Design for Precision Manufacture", by L. A. Husband, Chief Tool Designer, Buick Motor Div., Aviation Engine Plant, and "Fixtures for Heavy Equipment by Clare Bryan, Chief Tool Designer, Link-Belt Ordnance Co. J. R. Miller, Works Manager, Link-Belt Ordnance Co., served as chairman for both meetings.

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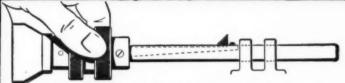
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Modern industry's dependence on "Jewels of Industry" is shown by gage blocks and gage instrument applications taken from the Company's film, "Precision Measurements in Industry." These applications point to the increasing vigilance necessary for quality control of production now and in the post-war era.

An introduction of the Company's training aids in use and care of gages and gaging instruments is shown as an important step which industry must take in teaching its inspectors, engineers, and machinists if manufacturing developments are to continue to improve.

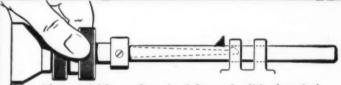
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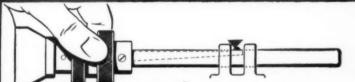


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NOTE

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HINTS ON MULTIPLE TOOL STEEL TURNING WITH CARBIDES ON TOMORROW'S MACHINES

By Ralph Granzow, Engineer, Carboloy Co., Inc., Detroit.

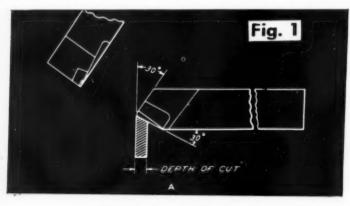
To meet increased production demands in the manufacture of war equipment, there has been a steady expansion in the use of carbides on multiple tool set-ups for the turning of steel. On such work it is now not uncommon to find many machines—such as shell turning lathes—equipped with motors having horsepower ratings of 50, 75 and even as high as 100 to obtain the maximum rate of metal removal.

Undoubtedly the results obtained with these modern, amply-powered and exceedingly rigid machines will have an important part in influencing the design of future machine tools intended for multiple tool turning of steel with carbide tipped tools. With such machine and motor capacities, the limiting factor in determining the production rate then is frequently shifted to the cutting tool and not the machine itself as has been the case up until recently. For this reason, it is essential that each element involved in tool design and use be given ample consideration to assure maximum freedom from tool failure. Unles this is done. both tool cost and production rate must he sacrificed.

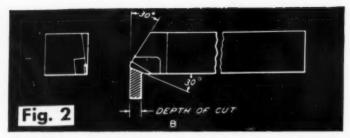
Field engineering work in manufactur-

ing plants in all parts of the country has disclosed the value of adhering to certain basic principles of cutting tool design. Fig. 1 illustrates a typical carbide tipped tool for rough turning shell, steel shafts. or similar work. For lighter cuts. 1/4" deep or less, it is usually better to use a too! having the same general shape as Fig. 1, but with the tip set in straight as in Fig. 2. This latter tool can be produced easily by regrinding a carbide standard straight tool to the desired shape. The only advantage inherent in the Fig. 1 tool lies in the fact that it can handle heavier cuts with its increased length of cutting edge. With the same size of carbide tip, however, the tool with the tip set in straight (Fig. 2) usually will permit a greater number of regrinds and therefore is preferred for all lighter cuts.

On multiple tool set-ups it is essential that the nose of the tool be held in a fixed relation to the side of the tool shank. Otherwise the cuts taken by the individual tools may not overlap, or if the cut is of a profile (contour producing) type, the profile will not be accurate. This means that in re-grinding, the original shape of the tool must be held. Good practice is to use fairly large angles for the side cutting-edge—say around 30°. Most modern steel turning operations are of such a character that large angles can







be used, but if for any reason there is a tendency to deflect the work away from the tools, the side cutting-edge angle can be reduced.

The end cutting-edge angle on turning tools for multiple setups is usually 30° which—in conjunction with the side cutting-edge angle—means that the included angle at the nose is around 90°. This assures adequate strength at the tool nose. The cam which controls the infeed of the tools at the start of the cut usually possesses an angle of approximately 25° which means that the 30° end cutting—

edge angle clears the work at the start of the cut by approximately 5°. For the tool which starts at the end of the work, the end cutting-edge angle can be decreased to 8° or 10°, thus adding to the strength of the tool. Usually this is not necessary and it is more convenient and economical to use the same tool at each position in the setup.

Practically all shop men are aware of the fact that a tool with a large nose radius possesses greater strength and resistance to shock than a tool with a small nose radius or a sharp point. One con-



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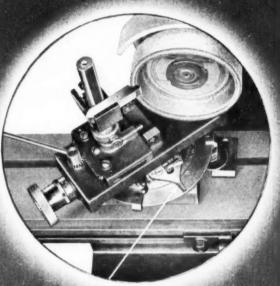
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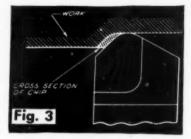
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sideration, however, which is frequently ignored is that the rate of tool wear at the nose is increased when the nose radius is too large in proportion to the depth of cut and feed. This is caused by the chip being thinned out excessively at the tool nose under these conditions. This is illustrated in Fig. 3.

The optimum size of nose radius is dependent upon many factors other than depth of cut and feed. Among these factors are the quality of finish desired, the size and rigidity of the work and the machine, eccentricity or interruptions in the cut, whether or not the work possesses heavy scale, and the development of chatter in cutting operations. In spite of the importance of each of these factors, however, the average steel machining job can be performed satisfactorily with tools having nose radii selected according to the chart illustrated in Fig. 4. This chart is based on the principle of using larger nose radii for heavier cuts and heavier feeds. This is a well established principle and is in agreement with both metal cutting theory and actual shop practice.



In selecting the nose radius for tools used on final finishing cuts for contour profiling work, it should be understood that the nose radius must be the same size as the radius on the cam follower in order to obtain the desired contour on the work. On many machines, the cam follower has a 1/16" radius.

Rake angles for multiple set-up steel turning tools are found to vary somewhat in the different manufacturing plants, but in general it has been observ-

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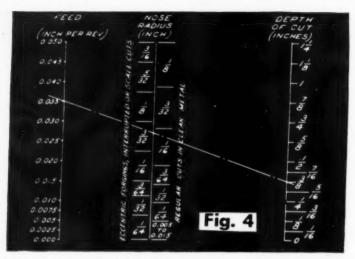
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ed that most plants employ tools having rakes of from 0° to 5° negative. Rake a 6° to 8° positive side rake and back angles in this range give highly satis-





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Fig. 5

Depth of Cut, Inch	Feed, Inch per Revolution							
	0.008 to 0.012	0.013 to 0.017	0.018 to 0.022	0.023 to 0.027	0.028 to 0.032			
	Width of Chip-Breakers, Inch							
1/64 to 3/64	1/16	5/64	3/32	7/64	1/8			
1/16 to 1/4	3/32	1/8	5/32	11/64	3/16			
5/16 to 1/2	1/8	5/32	3/16	13/64	7/32			
9/16 to 3/4	5/32	3/16	7/32	15/64	1/4			

factory tool performance. In a few instances, tools have been encountered with 0° side rake or even a slight negative rake. The idea was to increase the strength of the cutting edge, but I seriously doubt whether the slight increase in strength is enough to compensate for the increased chip pressures and resultant temperature elevation, except perhaps on heavy scale cuts.

Since practically all multiple steel turning tools employ ground in chip breakers, it must be kept in mind that the rake angles refer to the bottom surfaces of the chip breakers and not the top faces of the tips.

Chip breakers ground to a depth of approximately .020" and either parallel to the cutting edge or at a slight angle are capable of producing a chip easy to handle without creating undue chip pressure, providing the breaker width is selected to suit the combination of depth of cut and feed. The chart in Fig. 5 will serve as a guide for proper chip breaker dimensions.

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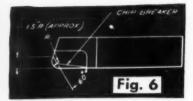
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If for any reason the nose radius used on a tool is greater than 2/3 of the chip breaker width selected from the chart, tool trouble may develop as a result of a choking up of the chip in the vicinity of the radius. One idea which will relieve this condition is illustrated in Fig. 6. A second method is to increase the chip breaker width. If the width of the chip breaker is increased, it is usually necessary to increase the depth as well in order to break the chip properly. Still a third method, which works out well when there is no great variation in depth of cut, is to increase the angle of the chip breaker.



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Care should be exercised in this case so that the useful length of the chip breaker will be sufficient to take care of the heaviest portion of the cut.

In the normal course of tool re-grinding there are two conditions which frequently develop. If not carefully watched. these are likely to create tool trouble. The conditions to which I refer are the tendency when re-grinding a tool to enlarge the nose radius beyond the specified dimensions, and to develop chip breakers narrower than originally used on the new tools.

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Enlarging the nose radius is due to the fact that the wear land produced in normal operation appears only on the side cutting-edge and the nose radius, and not on the end cutting-edge since it is not in actual contact with the work. If the dull tool is then brought into contact only with a portion of the tool showing a wear land, the result usually will be an increase in the radius at the nose. To regrind a tool without developing this condition, the end cutting-edge must be reground along with the dull portion.

To assure exact duplication of tool shape-including the nose radius-templates should be made up for each tool design and all tools should be checked against the corresponding template before issuing the tools from the grinding

In practice, it is usually found that tools for light cuts can be re-ground once or twice at the front and side before it becomes necessary to re-grind the cutting face (top) of the carbide tip. When this is done more than twice, the chip breaker width is usually decreased so much that the chips choke up and cause tool trouble. To eliminate any such difficulty, width of the chip breaker should be maintained during re-grinding to within .015" or .020" of the width which was originally used on the new tool. Tools used for heavy roughing cuts usually require re-grinding of the chip breaker each time the cutting edges are ground.

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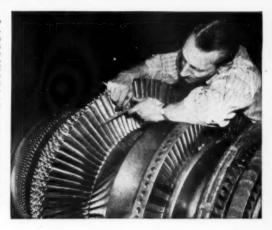
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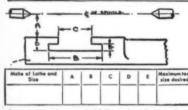
Turret Lathe Operations



on Engine and Bench Lathes with ENCO Turret Tool Posts

Turning, facing, boring, cut-off, threading and forming tools may be mounted in the turnet block of your ENCO Turnet Tool Post to speed production on your present engine or bench lathe. Fast action, positive indexing brings the next tool into position. Complete job can be set up at one time saving valuable lost-time on second operation set-ups. Turnet keeps setting accurately. All models mount standard rectangular or square bits as well as standard cut-off blades and boring bars.

"A" Dimension range	Model 6-S	Model 4-S	Model 31/2-S	Model 21/2-S	Model H
(from diagram on this page)	2"-3-1/8"	1-9/16"-2-1/2"	1-1/8"-1-3/4"	7/8"-1-5/16"	7/8"-1-5/16"
Lathe Swing	16" swing & up	13" to 16" swing	10" to 13" swing	Bench Lathe	Bench Lathe
Maximum tool bit	1" or 1-1/4" 1-3/8" toolholder for 3/8" bit (Where no tool bit size is specified, turret will be furnished for 1 inch tool bit)	3/4" or 5/8" (Where no tool bit size is specified, turner will be furnished for 5-8 inch toel bit)	1/2" Sq.	3/8" Sq.	3/8" Sq.
SPECIFICATIONS	6" square Packed in carton Shipping Weight 35 pounds	Packed in carton Shipping Weight 12 pounds	3-1/2" square Packed in carton Shipping Weight 8 pounds		3" Hex Packed in carton Shipping Weight 4 pounds



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- 12 position indexing
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Also all models with semi-soft base on center post for quick adaption to your lathe.

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ENCO Heavy Duty



SPECIFICATIONS	HD-1	HD-2
Size of turret block	4-1/2" Sq. 3" thick	6-1/2" Sq. 4-1/4" thick
Range of tool slot height	I" or I-I/4"	I-I/4" to I-3/4"
Tool Size Range	3/4"-1"	I"-I-I/2"
"A" Dimension Range	2"-3-1/4"	3"-4-1/2"
Maximum "C" Dimension	2-3/4"	4"
Price	\$99.00	\$130.00
Shipping Weight	20 lbs.	60 lbs.

Capable of taking the strain of hogging cuts under high speed. Designed to mount maximum tool bits. Tool overhang is cut to minimum in these heavy

duty models by the tools being mounted directly over the base of the turret. This increases the tool rigidity, permitting a heavier cut which reduces lathe time. 12-position tool indexing adds versatility to the rugged design of this accurate, cost-saving tool.

Models HD-1 and HD-2 can be shipped from stock with semi-soft base which can quickly be adapted to your lathe. One week required for turrets fitted from specifications. When ordering turrets to specifications please furnish all dimensions shown on the lathe specification chart. Be sure to specify maximum tool to be used.



ENCO Tailstock Turrets

Model B

5" In diameter with 6 bored tool holes.

Fitted with No. 2 arbor furnished with "" or 1" tool holes.

Fitted with No. 3 arbor furnished with "" tool holes.

Fitted with No. 4 arbor furnished with 1" tool holes.

"" tool holes are sto" tard on Model B with No. 2 or

No. 3 arbor unless otherwise specified.

Packed in carton. Shipping weight 12 lbs.

PRICE \$32.95



Model A

2½" in diameter with 6 bored %" tool holes. Fitted with No. 1 Morse Taper arbor or fitted with No. 2 Morse Taper arbor (No. 2 Morse Taper arbor (No. 2 Morse Taper arbor furnished unless otherwise specified.)
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PRICE \$18.95

ENCO Tailstock Turrets are carefully manufactured with all parts fitted within close tolerances. Each turret must pass several thorough inspections with the final inspection for concentricity of tool holes. Because the tool holes are bored after the turrets are assembled, ENCO Turrets are naturally very accurate. Their dependability is indicated by a substantial volume of repeat orders from users. Many shops begin with one ENCO Tailstock Turret to set up tools for a particular job. As other jobs come up, additional turrets are purchased and set up in the same way. ENCO Turrets are as easily set up in your lathe as a center.

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But you must take proper care of them just as you would other high-grade cutting tools.

Use Bath Taps on work for which they are designed — lubricate them — run fast — watch alignment — keep sharp— don't force— never allow flutes to clog — never use a worn-out holder.

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WORCESTER

MAS

THE FOREMANSHIP FORUM By Edmund Mottershead

This is the first of a series of four articles in which Mr. Mottershead considers waste from the standpoint of each of the four factors of production—men, materials, machines, and ideas.—The Editor.

THERE are four factors of production which are constantly threatened with waste:—manpower, machine power, materials, and plan-power or ideas. Considering the industrial experience of the nation, several large volumes could be written on any one of these topics. However, wartime conditions being what they are, the one frequently in the forefront of thinking is Wasted Manpower.

I think it was Somerset Maugham who said that the greatest luxury man could have was wasting time. Wine, women and song, pursuit of culture, gluttony, all stand aside before the extravagance which permanently sacrifices that which can never be replaced—time.

We are all agreed that every effort must be made to produce vital goods necessary to the prosecution of the war. Machine change-overs, and materials bottlenecks, have been at least partly solved. But

the problem of manpower is by no means diminishing in its seriousness. The government is crying to the nation that soand-so many million more women must be engaged in war industry to provide some of the necessary workers. Armed forces in excess of 11,000,000 men will require huge amounts of goods of all kinds, to say nothing of lend lease requirements and the 120,000,000 or so civilians who are still in this country. The farmers say they need several million additional workers. As this is written, many areas have been put on the 48 hour work week and other critical areas are facing the change.

But is it simply a problem of manpower in terms of numbers of workers and numbers of hours spent on the job? J. F. Lincoln, President of the Lincoln Electric Co., thinks not. "Experience has shown that too long hours merely result in scientific loafing. No individual can work beyond a certain number of hours per week without reducing output. Merely keeping him on the job reduces output. Twelve hours a day does not produce as much as eight hours a day. This

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BROWN READING PA

is not theorizing; it is the result of endless research."

"It is obvious that if people worked 24 hours every day, they would produce less than if they worked shorter hours. It is also obvious that if they worked no hours per day, they would produce less than if they worked shorter hours. The problem, then, is to find where, between these two limits, maximum production resides.

It is the problem then of having the worker produce during a work day of the right length, in a work week of the right length, and make that time most productive by giving him proper incentives and eliminating all possible sources of wasted time.

Incentives to help reduce waste of time by workers in the shop, and to make each hour more productive, have included bonuses, piece rate systems, vacations, annuities, and what not. However, the freeze is on, and many companies will find it difficult to initiate wage incentive systems. Some companies that have such systems may have to discontinue them. We will have to pay more attention to those other incentives of recognition and approbation to make the increased work week also more effective from a production standpoint.

KILLING TIME

"Killing time" is a familiar phrase, and is also apparently a good old American custom. One company had a particular time-killing problem in the old practice of quitting work and cleaning up the work bench before the end of the working day so that the operators would be ready to leave the shop promptly at the bell. Many of the men were stopping work half an hour early, getting washed up, and then loitering to chat or sneak a smoke before leaving. After some difficulty, the foremen in the various departments were able to get the situation fairly well cleaned up. However, the company was a small subsidiary of another and larger concern. As war contracts shifted and work demands changed. many of the older workers were shifted over to this concern, and the trouble started all over again. Fortunately, these gentle pleasures are confined to a relatively small minority of workers, but even so there is a significant and costly

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Manufacturers of special small universal, fractional H.P. mators, dynamotors, shaded pole mators, heater motors, generators. waste of time and consequent reduction of war production.

Work may have to be done over because of carelessness. The old slow-down practice of dragging out the job to make it last longer has not yet passed from the industrial scene. I have nothing against tobacco intrinsically, but "time out for a smoke" wastes time on the job. Loitering in halls and washrooms, visiting while on the job, unnecessary tardiness, and day dreaming, are other ways of killing time.

Second breakfasts, anticipating quitting time by cleaning up the bench during the last few minutes of working time, and waiting for assignments, make further waste. Asking unnecessary questions, unsystematic workmanship, lack of application to the job in hand, and changing from one job to another, are also causes of wasted time which can be traced to poor supervision and poor planning, but which nevertheless must be eliminated.

CAUSES OF WASTED TIME

Why do we waste time? Why is production reduced by lost time during working hours? There are three general types of causes, traceable to the job itself as set up by management, traceable to the foremen, and traceable to the individual worker.

1-Causes inherent in the job.

Causes inherent in the job as set up by management include poor planning, lack of proper supervision, improper working conditions, and improper equipment and materials. Poor planning will create bottlenecks and irregularities in the flow of work which result in some workers being under extreme pressure while others are dawdling along waiting for goods to come to them.

Lack of proper supervision is traced to top management because lack of supervision generally is the result of a lack of clear cut policies for foremen and supervisors to enforce and a lack of proper training for supervisors—training which should be provided by top management.

Improper working conditions will range from insanitary conditions in washrooms, dust and fumes not removed, too hot or too cold in the shop, dampness in the air, improper seats, benches, bins or convey-

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15/64	99				2.64	3/4	9.0	9.0			3.73
1/4	99				1.65	49/64	99	9.0		.7661	6.40
1/4	9.9			.2505	1.65	25/32	29	99		.7817	4.00
17/64	99	20		.2661	2.88	51/64	99	9.9	*********	.7973	6.40
9/32	22	99		.2817	1.80	13/16	12	10	*********		4.00
19/64	22	22		.2973	2.88	53/64		99	*********	.8287	7.04
5/16					1.80	27/32	11	22		.8443	4.40
5/16					1.80	55/64		29		.8559	7.04
0, 10				.3163	1.80	7/8	12	99	*********		4.40
21/64	9.9	9.9		.3286	3.32	57/64	99	29	*********	.8912	7.92
21/01				.3320	3.32	29/32		2.0	**********	.9062	4.95
				.3326	3.32	59/64		9.0		.9224	7.92
44 /00	99	99			2.08	15/16		29		.9381	4.95
11/32		99			3.32	61/64		22		.9537	8.80
23/64	99			2745	2.08	31/32		99			5.50
3/8	99				2.08	63/64		22		.9849	8.80
3/8						1"	**	**		1.006	5.50
25/64	**	24		.3911	3.76	1			*********		0.00

ABOVE PRICES ARE NET, F.O.B., N.Y.
Write for Our Catalog and Price List
Priorities Must Accompany All Orders

CENTER TOOL Machine Shop Equipment CO. 153 CENTRE STREET, N.Y.

We carry a complete line of H.S. Drills, Milling Cutters, Lathe Tools, H.S. & C.S. Taps & Dies, Drill Chucks, Lathe Chucks, Files, Special Taps & Dies



Would you like to know more about the new, war-born TRICO MICRO-CHEK now speeding up the gaging of millions of precision parts in over 3300 war plants? How inexperienced girls quickly become dependable inspectors? Send for our booklet which shows many applications of this accurate, speedier comparator gage.

MICRO-CHEK
TRICO PRODUCTS CORP.
10 Trico Square, Buffalo 3, N. Y.

ors, etc. Poor lighting and poor ventilation are other unsatisfactory conditions.

Improper equipment and materials are also laid at the door of management, altho in some cases beyond control, because materials may be unobtainable or there may be the necessity for doing the best possible with the machines at hand.

2-Causes traceable to worker.

These include natural laziness, which is part of all of us. Also poor working habits, which are usually due to a lack of proper initial training that would form correct habits, and fatigue, caused from too long hours and improper use of recreational and rest time.

Lack of intelligence is often blamed for failure on the part of the worker, but more often the real responsibility lies on those who place the worker on a job too difficult for him or who fail to give him adequate instruction on the job.

Irresponsibility of the worker is generally due to yet another cause—lack of proper incentives for doing the work. Some workers have a natural inability or dislike for doing certain types of work, and as a result, kill time while on those jobs. Distractions, worries, day dreaming and nursing grievances also are a part of the picture of wasted time traceable to the worker himself.

3-Causes traceable to foreman.

Causes traceable to the foreman include improper placement of men, failure to commend a worker for doing good work, failure to give workers adequate help, proper training, and encouragement, etc.

Insofar as production planning, layout, outlining the flow of work, scheduling and routing are the foreman's responsibility. If he fails to perform those functions well he is responsible for lost time of the worker.

Showing favoritism, creating causes for grievances and gossip, failing to maintain shop housekeeping and shop discipline, and making promises which cannot be kept, all break down worker morale and result in lost time.

TRICO PRODUCTS CORP.

Other factors are too much "bossing" without intelligent direction, and failure to be a real leader of men. The foreman isn't doing an all-around job. Time is



INDUSTRIAL Clutches by Conway

For smooth transmission of power and direction with positive command of starts and stops . . . these clutches are built dependably, efficiently and of finest materials and workmanship.

XYZ C UTCH WITH SHEAVE WHEEL MOUNTING. Suited to many grooves and diameters; single, tandem or triple plate construction in a wide range of capacities. A powerful transmission unit for use in limited space. Compact, small diameter, short length.

Patented in U.S.A. and Canada

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1541 Queen City Ave. CINCINNATI 14, OHIO

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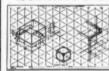
25 years specializing in Ball Thrust Bearings of every description.

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EASY TO MAKE AND READ !

One trial will make you are of steady user of WADE'S ISOM-ETRIC blue lined paper. Shows all

terior to scale. Makes clear blueprints. Saves time daily in hundreds of plants. Write for Circular. 1422 E. 199th St. Wade Instrument Co. Dept. H. Cleveland, Ohio

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GREATEST CAPACITY SMALLEST FLOOR SPACE

4 arms, 51* high, stacks 10,000 lbs.; 5 arms, 57* high, 12,000 lbs. flat or round stock. Pipe or tube, less weight, 3 stands for 201 lengths; 2 for 121 or shorter. Use against wall or back to back in center of room. Cost is small, value big.

Write for circular and prices. Priority Regulations govern delivery.

WM. S. YOHE SUPPLY CO. 503 Mahoning Rd., N. E.,

lost. Production is lost. And the boys in Italy begin to holler, "Where's the ammunition?"

RESULTS OF WASTED TIME

The results of lost time are many and unpleasant. The immediate loss of production is most apparent. However, loss of respect for the superiors on the part of the workers, loss of self confidence, loss of self respect and initiative, breakdown of worker morale end up with disrespect for management, poor work habits, carelessness, accidents, lack of cooperation, higher costs and general degeneration.

WHAT CAN YOU DO ABOUT IT?

There are four definite and simple steps which you can take to conserve manpower by eliminating wasted time: (1) Plan the work. (2) Give the worker added incentives. (3) Make sure the worker understands the value of time, (4) Train-

1-Plan the work.

The average worker, not only does not like to be kept waiting for more work. but the schedule of work should be so planned that he always has plenty without waiting. Time lost thru waiting, lack of systematic maintenance, and last minute changes in design or inspection standards, are directly traceable to poor production planning. Remember, for manpower to be utilized most effectively, the other factors-machines, materials, and ideas, as well as shop layout and working conditions must be coordinated.

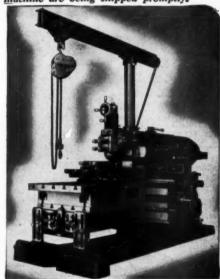
2-Give worker added incentives.

Time killing is usually the result of lack of interest in the job. It is the duty of top management, foremen and supervisors to see that the worker is enthusiastic about his job. How. By making him fully aware of the vital importance of his job-to the war effort, to the company, to users of the product, and to HIMSELF. Use the principle of enlightened selfishness intelligently applied. Bonuses, rates on jobs, vacations, shopping discounts, and other financial rewards can be used to build up interest in the job.



Orders for this machine are being shipped promptly.

U N U S U A L



This 36" Ohio Super-Dreadnaught Shaper is suited particularly to troublesome, large, odd-sized jobs. Table, 30" x 48". Ram bearing in column, 56" x 15". Length of ram without head 80". Long ram allows 36" of stroke at any position on table or if

job projects beyond front of table. Maximum distance from drop table (when furnished) to ram, 30°. Weight of standard machine, 13,400 lbs. Complete range of standard accessories available, especially attachments for railroad work.

THE OHIO MACHINE TOOL COMPANY • KENTON, OHIO

OHO DREADNAUGHT
NORIZONTAL BORING, DRILLING *** MILLING MACHINES - SKAPERS - PLANERS

However, it may be that due to the present freezing of wages and prices. your company cannot make financial gain an incentive to your men. In that case you have to rely more strongly on the second greatest desire of all men and women, the desire to feel important, the desire for recognition and approbation. I once asked the vice president of a firm employing 1800 men why they had no labor trouble. He told me it was largely because the five or six men who made

Unique construction enables operators to rapidly

determine temperature even on minute spots, fast moving objects or the smallest streams; no

THE PYROMETER INSTRUMENT CO.

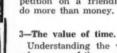
correction charts, no accessories, no upkeep.

THE SIMPLIFIED

ODTICAL DYROMETER

up the top management knew the first name of every worker in the plant, and always made a point of calling each worker by name when occasion arose. A small thing, yet it made every worker feel important as an individual instead of being an unrecognized cog in the ma-

Recognition for good work, for years of service, for new ideas, and suggestions, for safety, either individual or departmental, plus some simple challenges to the workers thru inter-departmental competition on a friendly basis will often do more than money.



Understanding the value of time will solve many of the aspects of time-killing. If the worker fully understands that less production means less pay, he has self interest to keep him busy at work. If he understands that the 15 minutes a day he wastes, multiplied by every other worker in the country wasting time also. could produce another destroyer fully equipped and ready to chase enemy subs. he has a little more patriotic urge to produce consistently and effectively. If his patriotism and good sense can make him realize that he is bettering plant morale by setting a good example, his pride and sense of self importance will support and strengthen the good habits once begun.

4-Training.

Lack of intelligence, lack of ability, lack of job skill, foolish and unnecessary questions, rework, scrap, pestering other workers-all of these can be eliminated by proper job instruction at the time the worker is introduced to his job. It is the responsibility of top management, therefore, to see that set-up men, supervisors, foremen, all those who break in men on the jobs are skilled and competent instructors. Much of the problem is solved if then in addition, the jobs are each carefully broken down into their component skills and operations so waste time is eliminated, their hazards understood and guarded against, and key points of the jobs made second nature with the workers.



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Whether it is

tools to produce, or the production itself. We work from rough idea. Part print — sketch — or just talk it over with us. Inquiries will bring prompt quotations.



Tools — Dies — Jigs — Gages — Fixtures — Special Machines—Production of parts in large quantities — Production of assemblies from raw material to finished product. — In addition to our own equipment we have ex-

tensive subcontract outlet.

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Grinding, Sanding, Drilling, Buffing . .

Take the TOOL TO THE JOB!

STOW FLEXIBLE SHAFT MACHINES

Save Effort . . . Speed Output

Stow Mobile Power units save moving or positioning heavy pieces. They reach the work from any angle, cut "make ready" time to a minimum. Stow's 69 years of leadership manufacturing flexible shafts is your guarantee that Stow Flexible Shaft Machines have sugged dependability

plus the easy portability required by today's hurry-up schedules. Our new catalog is just out, containing information which every production and purchasing man should have.

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NOW! Stow Separate Shafts for Your Own Motor!

A Staw Flexible Shaft, plus the great variety of attachments available, quickly convert any idle motor into rotary file, wire brush, heavy-duty deili, grinding wheel, etc. The Fiexible Shaft makes such tools accessible to several operators or at a distinct of the state of the s

Write for information on lengths, sizes, attachments, etc.



STOW

MANUFACTURING CO. 30 Shear St., Binghamton, N. Y.



Faster cutting, cleaner cutting, finer finishes, greater accuracy... these carbide tipped efficiencies are now available for your face milling and shell end milling jobs. For Super Tool engineers have developed this new line of Carbide Tipped Shell End and Face Mills!

Here's another step forward in carbide tipped standardization! These cutters are available in standard sizes, both for non-ferrous materials and in the Super NEGRAK (negative rake) type for cutting steel. They are manufactured on a production basis and the

shell end mills may be purchased in the left-hand type at standard prices. When you buy a Super Carbide Tipped Face Mill or Shell End Mill, you enjoy economies that start with the first cost and continue through every operation of the cutter's exceptionally long life.

Super Carbide Tipped Shell End Mills and Face Mills are worthy additions to the line of Super Carbide Tipped Tools —tools that are setting new records of performance and economy on all types of cutting jobs the country over. Write TODAY for details of the complete Super Tool line.

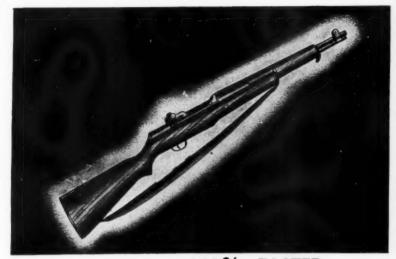


Let us send you this literature giving complete details and prices of Super Shell End and Face Mills

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 4105 San Fernando Rd., Glendale 4, Cal.



THEY'RE MAKING 'EM 443% FASTER . . .

... a few months back only 33 gas chambers on automatic rifles could be finished per hour to plus .0000" minus .0005" tolerances. Lempco Hi-Speed Steel Reamers increased production to 133 per hour! They also eliminated expensive and costly wear on plug gauges caused by abrasive left in the holes. About 1,000

pieces are reamed before the Dual-Spiral removable blades require re-sharpening. The patented Lempco-Evans Hi-Speed Steel Reamer finish-reams mirror-smooth holes fast and accurately in all machinable metals and plastics.



The Star is for Continued Outstanding Performance. WRITE FOR SPECIFICATIONS

LEMPCO

BEDFORD, OHIO, U * S * A

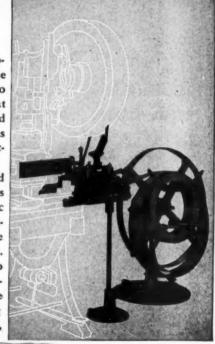




Our Punch Presses Are More Flexible And Productive With WITTEK Automatic Roll Feeds And Reel Stands

Manufacturers of metal stampings facing problems in the feeding of coiled strip stock to punch presses will find that Wittek Automatic Roll Feeds and Reel Stands conserve man-hours and achieve new high production levels.

Providing an improved and simplified method of punch press operation, Wittek Automatic Roll Feeds and Reel Stands insure rapid, safe and accurate feeding under all conditions. Made in four different types to meet all automatic feeding requirements. Write for complete details. Wittek Manufacturing Co., 4305-15 West 24th Place, Chicago, Ill.



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ROLL FEEDS and REEL STAND

For All Makes and Sizes of Punch Presses

GENESED ADJUSTABLE HOLLOW MILLS



(Standard Style H)
Facing & Counterboring
Tool

ing Department is always ready to serve you

Write for complete Catalog No. 42-]
GENESEE

in your Production Tool problems.

MANUFACTURING CO., Inc. ROCHESTER 4, N. Y.

BURKE Announces

New DEVELOPMENT that Cuts Bolt Drilling Costs

Recent tests by Army Air Forces Materiel Command showed that cost of drilling A & N engine bolts with this new Burke machine is 50% or less than the drilling costs of other methods. Full details will be sent on request.

This new Burke bolt drilling machine has a normal capacity of 325 drilled bolt heads per hour. Each bolt is drilled with 6 hori-

per hour. Each bolt is drilled with 6 horizontal holes and one central hole. As operator becomes more experienced, production capacity may be increased.

Bolts are placed in an automatic chuck, heads down, and are held rigidly in that position while all seven drills are operating on the head simultaneously. Meanwhile, the operator has ample time to run the vertical drill sursended over the ma-

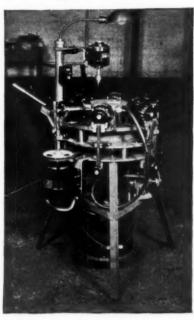
while, the operator has ample time to run
the vertical drill suspended over the machine, through the holes, thus reaming and
burring the drilled holes.

At fingertips of the operator are adjustment screws, controlling depth of horizontal
and vertical drilling. Adjustment may be
made while machine is in operation.

Drill breakage is reduced materially since
spring empenation prevents sudden

spring compensation prevents sudden breaking through, which is common with hand operated machines.

Timing of the drill movements may be changed to accommodate skill of the operator and moved up to the capacity of the drills to remove metal.



Check these Advantages . . .

Normal production capacity of 325 drilled heads per hour, which can be increased with experience.

Operator has time to ream and burn drilled holes.

Fingertip adjustment of screws control depth of drilling.
Adjustments may be made while machine is in operation. Spring compensates and prevents chances of drill breakage.

Let us send you full details.

W. B. BURKE & CO. 1609 East 36th St. CLEVELAND 14, OHIO



ACCURATE STOCK CONTROL HELPS IN COMPUTING TAX By ARTHUR ROBERTS

A STOCK control system is essential to profitable costing and accurate income tax preparation. Many machine tool users are lax in their methods of handling stock. From a recent field study, I find that they do not make maximum use of stock control for these reasons:—(1) They assume it is costly and involved; (2) They use a system badly "tailored" to requirements; (3) They use too elaborate a system; (4) The system is satisfactory but badly managed.

Based upon this field study, I have developed a system, simple, inexpensive, all-purpose and compact, that will enable the machine tool user to keep an accurate control of inventory. Thus he can earmark theft, waste, errors and mismanagement that result in losses which may be permissible income tax deductions, and will also assure accurate costing of production. One stock control card

per item is usually sufficient. Little time is required to keep accurate recordings.

The face of this card is a numerical graph recording movement of materials and supplies, month-to-month, in weights, liquid measure, lineal footage, square footage, containers, boxes, dozens, gross or units. Dollar value is not shown.

Suppose the starting inventory in January is 1,000 units. Place this figure beside "Stock" under January. During January, 500 units are received. Enter this figure beside "Rec'd" in the square below. Withdrawals for production are 1,200 units, as shown under "Monthly Disbursements", hence, the balance on hand starting February is 300 units. Follow this procedure each month.

Stocks should be withdrawn only on signed requisitions. File the slips. Recordings may be made in small pencil figures, numerals or markings, erasing them at

L-PA COUPLINGS



Correct for misalignment, absorb shock and vibration. Save machinery. Couplings NON-LUBRICATED. L-R Type "IA" (left) for light duties. Send for Catalog and Selector Charts.

LOVEJOY FLEXIBLE COUPLING CO.

5026 W. Lake St.,

Chicago 44, III.

STOCK CONTROL CARD

For materials and supplies

1 cen			suppl:	ler			Spec1	ricat	Igna		Style		Size	
Grade		H	ow pas	cked			Leng	th	Wo	ight		Min.	Ma	r
				M	ONTH	LY RE	CORD	or bu	BURSE	ESTS				
Tear	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	MQV,	Dec.	To	tal
1944														
1945														
1946														
		1	ONTHI	Y RE	CORD	OF S	TOCK	ON HAI	D AND	PURC	e e e e		Total	Team
Stock														1944
Rec'd														-
Stock														1945
Rec'd														Ĝ
Stock														1946
DOOOL														

the end of the month, inserting total in ink for permanent record. Use a slanting line (/) to indicate a certain unit or quantity, such as 30 hacksaw blades or 1,000' of tubing or steel rod. Cross every 4 diagonals with a horizontal line to represent 5 issues or withdrawals for production. One square, which measures ½"

wide on a 6x8" card, will take care of many entries and provide a quick concentrate of stock on hand from day-today, week-to-week or month-to-month, depending on how you make recordings, daily, weekly or monthly. If you need more space, use larger cards.

Additions to stock should be entered

Reverse side of stock control card

Date ordered	Cost price per unit	Date delivered	Remarks	
1	1	1		
i i	1			
		1 1		

COMPLETE EQUIPMENT FOR

Automatic Coolant System

NEW . . . FOR ALL HORIZONTAL BAND SAWS-Increase Production and Increase Blade Life - equip your saw for coolant cutting with a Gray-Mills Model S-30 system. You simply set the saw upon the coolant pan - hook up the feed tube-plug in the cord-and your saw is ready for wet cut- \$79.50



The New S-30 System is an improved design of the Gray-Mills S-20 System. It has an improved gear type pump with automatic

pressure relief valve.

Gray-Mills' exclusive slotted feed tube for saw blade application; the flow control petcock above the feed; control switch in the cord; and special forced-settling baffles for separating chips from the coolant are other S-30 features. It's easy and economical to equip any of your machine tools with a Gray-Mills Portable Coolant System-to give them the tool-saving and production-increasing advantages of using coolants. Gray-Mills Systems include a complete range of pumps, coolant return pans and fittings for quick and simple application to most any machine tool. Varied pump capacities, both gear and centrifugal, are available to provide proper pressure and volume for the job.

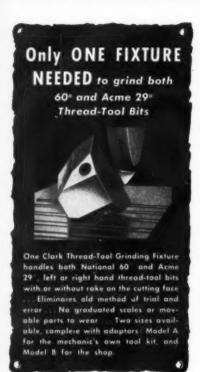
See your distributor or write for complete details.

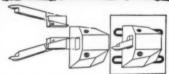


PROMPT DELIVERY GRAY-MILLS CO. 1945 Ridge Ave., Evanston, III.

Complete Portable

FRACTIONAL H. P. PUMPS INDUSTRIAL FLUID REFRIGERATING SYSTEMS





How to grind 15° right and left hand bent tools with standard adaptors.

For complete and fully illustrated data on Clark Grinding Fixtures, write for Bulletin MTBB-5GF

In Canada: DOMINION BEARINGS, LTD., Toronto, Montreal, Winnipeg Export: THE AMERICAN STEEL EXPORT COMPANY, INC., New York, Los Angeles

Robert H. Clark Company
9330 Santo Monico Boulevard
Beverly Hills, California, U.S.A.

from "Stock received" tickets, and entries may be made with diagonal markings, or small penciled numerals, erasing at the end of month and inking in totals. If the heads at the top of the suggested card are inadequate, revise to suit. Adjust the fundamentals of this system to your requirements.

File cards alphabetically according to item. "Min" and "Max" stand for minimum and maximum quantities to be carried. If these extremes are set on an item. based upon past experience, the machine tool user can tell at a glance whether stock is within bounds. When the stock approaches minimum, re-order, stop ordering when at maximum. This phase of stock control is extremely important today when lack of materials and supplies, due to inadequate stock supervision, may hold up production. Supplies are scarce and must be watched carefully. Many inexperienced workers play hob with cutting tools and other producing units today. An adequate stock control system will reflect this inefficiency before it becomes too costly, enabling the management to put into operation a program educating inexperienced workers to better shop practices. A running record of hacksaw blades, abrasive materials, cutting oil, boring heads, taps, flexible cable for shaft equipment, files, tool bits, drills, lapping compound, etc., may be kept on this card, minimizing the danger of "outs" and production delays.

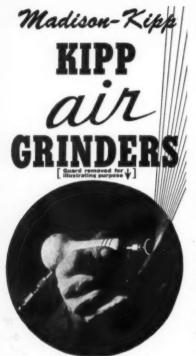
The back of this card may be used to list the date materials were ordered and received, cost price and other pertinent data under "Remarks". This provides a chronological record of price changes and the gap between order and delivery dates, serving as a guide to future order placement. Information on inventory limitations and other war restrictions may also be placed here.

This card covers a three year period. Most stock control cards cover only one year, making it necessary to write up new cards annually and retaining an unwieldy number of cards for comparative checkback. This card is compact enough, in most cases, so that supplementary cards need not be written up to take care of additional recordings. In some instances,



THE CINCINNATI SHAPER CO.

CINCINNATI DHID U.S.A. SHAPERS - SHEARS - BRAKES



Every teelmaker, every tool crib, every machine shop and thousands of production jobs need a model H, K or VT Ripp Air Grinder or all three of them. Because of expanded facilities the delivery position on high ratings has been measurably improved. Accessories in reasonable quantities can usually be shipped out of stock. Madison-Ripp Air Grinders were developed by practicing tool makers so they are practical. They usually pay for themselves on a single job. Madison-Ripp Corporation, Madison 4, Wisconsin. \$2075

MADISON-KIPP CORP.

MADISON, WISCONSIN

if information is not complete so that recordings can be made, clip the available data to the card until recordings can be entered.

For the present, stock control is essential because of the higher cost and greater scarcity of materials. Any loss on inventory today thru mismanagement means more than in days when the markets were wide open. In postwar years, inventory may drop and unless you have an adequate system, you may not be able to identify losses, or figure them accurately to get allowable tax deductions or determine your exact profit. If your inventory is inflated you pay more tax. With an adequate stock control system you can compute inventory more accurately and get an accurate tax figure. That is why I am stressing the desirability of adequate stock control and offer this system.

Then too, many new products will be produced in the postwar period. Many machine tool users will be employing new and untried materials and equipment in developing these new products for postwar markets. To obtain the right perspective on costs and your income tax liability, it will be necessary to keep a tight control on stock and supplies, which can be done only by an adequate system of stock supervision. In postwar years, volume will be heavy to supply civilian demand. long bottled-up by war restrictions and stock control will save many dollars, then as now. If you use stock control, check over the system carefully, revise it if needed. If you do not utilize this important managerial tool, now is the time to get the system in good running order so you will have the wrinkles all ironedout by the time they sound the last "Allclear" and so you can provide the Treasury Department with an accurate statement of your tax liability.

TAPPING MACHINE BULLETIN

L. J. Kaufman Mfg. Co., Manitowoc, Wis., has issued a 4-page bulletin No. 828, presenting facts on its line of "Hi-Duty" tapping machines. Included are pictures of the single and dual spindle tappers, special machines and fixtures, along with specifications, principle of operation and special features of these tapping machines.

SHAPING · Milling · Drilling · Boring NOW AVAILABLE ON Bridgepon



A new shaping attachment adds greatly to the utility of Bridgeport machines. The design is such that this new attachment (shown on back end of overarm) can be mounted on existing Bridgeport turret Milling Machines and also on other types of milling machines and special production equipment.

Shaping operations can be performed at all angles, making this attachment fast and prac-

tical on die and mold work of all kinds, as well as for intricate slotting on production jobs.

The Bridgeport Turret Milling Machine with High Speed Attachment handles milling, drilling and boring at all angles, with maximum ease and convenience. It is accurate and speedy, sturdy and powerful-a precision machine for production demonds.

Features include: - 15" diameter turret with 5" overarm, rugged construction, table, knee and saddle in convenient front-ofmachine position, anti-friction bearings throughout, keyed overarm with worm wheel control for angular settings, large diameter graduated dials.

Write for illustrated bulletins giving full information.

Write for

Bulletins Giving details THE BRIDGEPORT MACHINES, INC. Bridgeport, Conn.



UTILITY TOO

In a matter of minutes you can convert your engine lathes into screw machines. Simply remove tail stock and install a Utility Turret and Crossfeed Cut-off. Turret has rack and pinion which assures steady feed. Raised bearing surface eliminates all chip trouble. Has two taper gibs for take-up and alignment. All ways and bearing surfaces are ground. All inserts, bushings and pins are hardened and ground. Hex is 51/8" across flat, 2-7/16" thick. Accommodates a 34" hole or a No. 1 or 2 Morse taper. Fits Logan, South Bend, Atlas, Craftsman, 10" Sheldon, Clausing, etc.

Cross Slide pictured here has rack and pinion, two tool holders with adjustable jacks. Weight approximately 40 lbs.

Collet Closer parts are hardened and ground. Full ball bearing. Only wear is on ball bearings. Write for detailed literature and prices.



\$55.00



1370 West Washington Blvd. LOS ANGELES 7, **CALIFORNIA**

\$60,60



Symbol of Satisfaction

in

FLEXIBLE SHAFT MACHINES

The WYCO Line includes a complete range of rugged, dependable Flexible Shaft Machines — built to meet the most exacting requirements — delivering 100% as proved by outstanding performance in satisfying the most severe demands of war production everywhere.

There are WYCO Units to fit every plant situation— single and multiple speed Floor, Bench and Suspension models; also multiple speed Jack Shaft and Radial Type machines— a wide selection for heavy, medium or light duty.

WYCO Machines are setting the record for longer shaft life and greater production for every unit of power.

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WYZENBEEK & STAFF, INC. 838 West Hubbard St., Chicago 22, III.

WYCO Patented Non - Metallic Innerliner.

Makes the Core last longer — Run smoother — Transmit more power.

You Can Speed Your Production With This Wade Precision Lathe



WADE No. 8-A TOOLMAKERS' PRECISION LATHE SPECIFICATIONS

at retition tons	
Length of Bed	
Distance between Centers 24"	
Swing over Bed	
Swing over Cross Slide51/3"	
Swing over Compound Slide 21/2"	
Size of Tools	
Cross Slide Travel5"	
Tailstock Spindle Travel 31/4"	
Compound Slide Travel21/2"	
Collet Capacity1"	
Taper Standard for Centers	
No. 2 Morse	
Width of Driving Belt 13/4"	
Clear Hole through Spindle 13/16"	
Spindle Nose, Hardened and	
Ground Threads 2" x 10 TPI	
Height above bench to center	
line of Spindle	



Bench Lathes and Profilers For Precision, Versatility And Stamina You can speed your production with this Wade No. 8-A Toolmakers' Precision Lathe because it is precision built for precision work . . . enabling your men to work faster, with greater accuracy and with less spoilage.

All control and operating features are carefully worked out for efficient handling of the work. These close tolerances are possible: Thread cutting operations: Overall error in lead will not exceed plus or minus .0005° per foot. General turning operations: Accuracy within .0003° over distance of any one foot. Facing: Will check within .0002° concave and .0000° convex on an 8° face. You can depend on Wade Precision Lathes for precision, versatility and stamina.

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THE WADE TOOL COMPANY

WALTHAM 54, MASSACHUSETTS

Yes, in minutes ...

YOUR ENGINE LATHE IS CONVERTED INTO A PRECISION TURRET LATHE — WITH THESE 3 SPECIALTIES DEVICES



Specialties Cross-Slide Turret—Gives you four working positions without tool changes . . . allows multiple machining operations on one lathe. Easy to operate—merely flip the turret from one position to another. No. 30 for 9" to 12" lathes; No. 60 for 13" to 20" lathes.



Specialties Tail-Stock Turret—Quickly converts engine lathe into 4-way turret lathe for end work. You can perform four different operations with the four positions. No.58 with No.2 Morse Taper Shank; No.103 with No.3 Morse Taper Shank; No. 104 with No. 4 Morse Taper Shank.



Specialties Lathe Stop—For multiple operations—eliminates repeated measuring. You measure only once for each operation. Once the four positions are set, you just index. No. 10 for 9"to 12"lathes; No. 20 for 13"to 20"lathes.

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	Please send me full information on SPECIALTIES lathe accessories.
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That's Why the HOVIS METHOD

of Making Washers has become a necessity

By simply investing in Hovis Master Dies to fit your requirements and using 5 EASILY REMOVABLE, INTERCHANGEABLE PARTS, you can make any size washer. You save the materials and cost of making a new die for each size and type of washer.

When planning your postwar products, remember that a number of Hovis Master Washer Dies have been in continuous use for more than 4 years, and the Master Dies themselves do not become obsolete. A new set of interchangeable parts are all that you need for your new products.

Hovis Screwlock Company, 8100 E. Nine Mile Road, Van Dyke, Michigan (Suburb of Detroit) Phone Centerline 1575.



Made in 4 sizes: 3/4"-11/2"-21/2"-4"

HOVIS

UNIVERSAL MASTER
WASHER DIES

Sou Talk Shop

OTHER HANDY USES FOR STRIPPER BOLTS

By H. F. WILLIAMS

So-CALLED stripper bolts or headed shoulder screws, designed primarily for press punch and die work to hold stripper plates in exact alignment, are adaptable to numerous other uses. Specially designed pivot screws, studs or spindles, requiring designing detailing and machining time, often can be replaced with these standardized bolts. They are made by many of the leading screw manufacturers on a production basis. Parts that rotate, pivot, or oscillate, as shown in these tried and tested representative applications, are centered on these commercial screws.

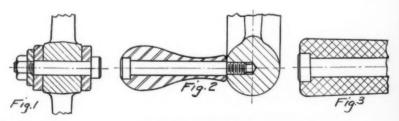
Made of chrome molybdenum, chrome nickel or other alloy steel, they are heat treated for toughness rather than hardness. In fact, they are machineable if special designs are required. The thin heads contain hex shaped sockets for insertion of wrenches, which are more effective for tightening than screw driver slots. Made in four diameters and in a wide range of lengths, advancing by ¼," the designer, tool maker or machinist has a varied selection. The last paragraph

gives the principal dimensions of stripper bolts available from the manufacturers' stocks.

In the link assembly shown in Fig. 1, the lever hub is flanked at either side by a link. Altho the small clearances necessary are not shown, the combined thicknesses of both links and lever hub need be only from .008 to .015" less than the length of the screw body on which they pivot. A retaining washer is screwed up tightly against the screw shoulder by the hex nut.

When machine and other handles are of the free or rotating type rather than the solid variety, the use of a stripper bolt as the spindle eliminates one or possibly two special pivoting members as in Fig. 2. The handle is counter-bored to accommodate head of the screw. As can be seen, the chamfer at top of the head blends in nicely with the end radius of the handle. The screw threads into the handwheel.

In Fig. 3, a square-ended handle with rounded edge is shown. Such handles have been made of wood, plastic, hard rubber or metal, depending upon the application. The screw end is the same as that illustrated in Fig. 2.

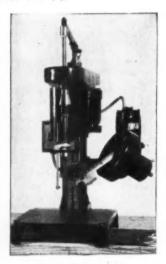


May, 1944

The Problem of Handling Small Screws is Solved

A Production Machine that Drives Small Screws at One Second Each.

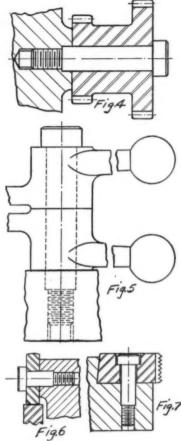
MACHINE HANDLES From No. 2 x $\frac{1}{8}$ Screws Up to No. 6 x $\frac{3}{4}$.



SEND SAMPLES FOR PRODUCTION ESTIMATE

DETROIT POWER SCREWDRIVER CO.

2809 W. FORT ST., DETROIT 16, MICH.



Idler gears, within reasonable size, can be mounted on these shoulder screws as shown in Fig. 4. Here, the screw body protrudes into the counterbored hole in the casting. This is done essentially for strength against possible shearing action. If the design requires more accurate alignment, a longer screw is used and the body is piloted more deeply in the casting.

NOT "Just Another" SHAPER-



Assures Greater Output-Better Finish

The latest in shaper design and efficiency, the new Super Twenty Shaper offers many advantages both in quality and output not available in older models. This new shaper is highly adaptable to a wide variety of work, from the heaviest roughing to the finest precision tool room work.

The ram is of the V-type of wide bearing, both bottom and sides. The clutch is the dry multiple-disc type, requiring minimum attention and adjustment. The feed range is extremely versatile — from .008" to .191". Changes of feed are quickly, easily accomplished. A high torque motor for the power rapid traverse is standard equipment, with many unusual features. An electrical limit switch is incorporated into the rail, offering complete motor control. Timken Bearings are used throughout.

For top performance, speed, versatility, accurate workmanship, and unusual economy both in first cost and upkeep, the Queen City "SUPER TWENTY" Shaper will meet with your entire satisfaction. For full details regarding features and specifications of this new Shaper, write Dept. BB. Agents in principal cities.

QUEEN CITY
MACHINE TOOL CO.
217 E. SECOND ST.
CINCINNATI 2, OHIO



AND SPEED JOBS

Read what experienced machine shops write:

"Eliminates burning entirely"

"Am enabled to use centers indefinitely"

"Can increase speeds without undue heating"

MADE especially to lubricate dead centers of lathes. Provides effective protection against overheating, softening and scoring. Increases production and promotes accuracy by permitting heavier cuts, IN HANDY TUBES higher speeds and Easy to Apply

tighter set-up.

Use it also for steady rests, jack screws and other applications where a lubricant of extreme film strength is required.



1. 4 and 8-oz. at your regular supplier or write for folder LC69.



JOSEPH DIXON CRUCIBLE CO., JERSEY CITY 3, N. J.

In Fig. 5, a pair of levers superimposed one on the other, are pivoted on a shoulder screw. The levers oscillate separately. If loads are comparatively light, the screw can be shouldered against the finished surface of the hub of the casting instead of counterboring as shown.

Rollers can be pivoted on these screws. but here because of the short length of roller bearing, the depth of counterbore must be held quite accurately. Roller alignment in this application depends upon the face of the boss so that only several thousandths clearance is allowed. Wider faced rollers or those having a wide bearing surface in the hole, need not rely upon the casting shoulder for alignment but only as a means of confinement axially.

Swiveling auxiliary vise jaws, compensating in action for proper aligning purposes as in Fig. 7, can be positioned by a stripper bolt. Jaw is centered along the circular tapered edge (plan view not hown) rather than by bolt which only icts as a retainer. Here the hole in the iaw is made larger than the body size of the bolt.

Other applications are possible with this type of screw, among them being pivoted foot treadles, gear and clutch shifting forks and shoes, cam mechanisms, single flat links, wire links and rods, loops of tension springs, pivoting rod ends, pawls, pulleys and others,

Of the four sizes of screws obtainable, the smallest has a body diameter of 3/4" the head of which is 9/16" in diameter by 1/4" high. It has a 5/16"-18-thread by 1/2" long. Body lengths are from 1" to 4".

The largest screw is 3/4" in diameter. with a head 1" in diameter by 1/2" high and a thread of %"-11 by %" long. Lengths of bearing surface range from 11/2 to 7. There are two intermediate sizes of 1/2 and 5/8" diameter bodies.

BISSETT STEEL FOLDER

A four-page bulletin entitled "How Tool A four-page oungen entitled from fool Steel Tubing Will Save You Time, Money, Manpower and Metal" is available from The Bissett Steel Co., 945 E. 67th St., Cleveland 8, Ohio. The folder contains interesting details on the use of the Bisco steel tubing in the making of blanking dies, punches, collets, spindle thrust collars, rim rolls, ring gages, spacers, and many other tools and parts.

PRODUCTION LATHES

NOTE: Special stationary air cylinder and full $2\frac{1}{4}$ " bar capacity through spindle. Designed for speeds up to 1500 R.P.M.

Start with the Minneapolis "Basic" Lathe — and hold down your cost by adding only the equipment needed for your particular production job.

Cross-Slide-

EXTREMELY ADAPTABLE for any production set up. With the Minneapolis "BASIC-UNIT-PLUS-PARTS" Plan, you have a high-speed, heavy duty production lathe "failor made" for your requirements. Any additional equipment can be added as needed, plus many other practical attachments not shown here.

IDEAL FOR WOMEN OPERATORS — Simplified design — ease of operation — less fatique — enable inexperienced women to become fast operators and turn out volume production. This sturdy machine takes heavy cuts without "chatter".

A QUALITY LATHE et an ECONOMY PRICE—
With the Minneapolis "BASIC-UNIT-PLUS-PARTS"
Plan you get 21/4" collet capacity — 14" swing
— heavy duty spindle assembly — performance
that will successfully compete with much higher
priced turret lathes. Write us your production
problems — send sample part or drawing —
let us quote you on a lathe exactly suited to
your work.

A 'lesp' FOR WORK

CENTRAL MACHINE WORKS CO.

Machinery designers and manufacturers since 1890

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WRITE FOR

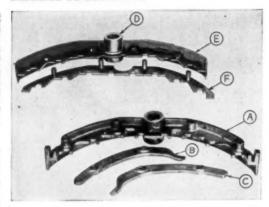
BULLETIN

CASTINGS TO STAMPINGS

The illustration shows an interesting design of conversion. It is, of course, accepted, everything being equal, that a die-cut stamping is superior to a sand casting from a number of standpoints. The physical properties of a stamping are more constant, and are not subject to some of the common difficulties experienced in average foundries.

If a part can be die-cut, rather than cast, all commercial tolerances are readily preserved, and duplication is more or less assured. On average casting machining, stock has to be allowed, together with general allowance for shrinkage,

with general allowance for shrinkage, warpage and other foundry practice. Smoothness and finish of die cut stampings are always assured, and final finishing of stampings is kept at a minimum.



"A" "B" and "C" represent the castings, while "E" and "F" represent the two stampings. "D" is a screw machine part. Parts "E" and "F" were produced from a Die of original design. Part "D" was a



UCKING INDEXING

FOR USE ON MILLING MACHINES

The Dearborn Fixture meets the demand for automatic chucking and indexing, permitting several operations on the same piece with only one setting. Its simplicity of design, high precision, milling accuracy and speed of operation has led to its adoption by many of the leading manufacturers thru-out the country.

Work held by automatically opening and closing collets. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces.

Write for Folder

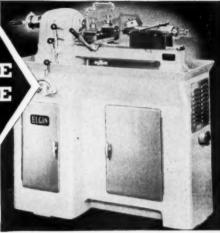
J. W. DEARBORN

ANSONIA, CONN., U. S. A. WITH . . .

VARIABLE' SPEED DRIVE

120 to 3800 R.P.M.

Elgin makes it easy to get perfect results!







Let's say your operator is doing a fine drilling and tapping job on a hand screw machine. He needs a high spindle speed for drilling, a low speed for tapping. On an ordinary machine it may take him longer to stop the machine, shift the belt and start again, than to do the tapping operation itself. Being human (and perhaps pressed for time), he may not bother changing speed. Result: A job not up to specifications.

The VARIABLE SPEED DRIVE on these three Elgin Precision Ma-

chines encourages the operator to use the proper speed for every operation, changing as often as necessary. By an easy shift of the control lever (arrow, above) he obtains instantly any speed within a wide range of RPM. By the time he has indexed the turret, the proper speed is ready—no stopping machine, no shifting belt! Investigate these three outstanding machines for your small parts production where precision counts: Eigin Precision Hand Screw Machine, Eigin Horizontal Bench Lathe.

ELGIN



Illustrated (1)
Hand Serew Machine (variable
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HPM), 20 3800
HPM), 20 181
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Precision Hand Screw Machines, Horizontal Bench Milling Machines and Bench Lathes — all three feature the VARIABLE SPEED DRIVE.

ELGIN TOOL WORKS

1770 BERTEAU AVENUE CHICAGO, 13, ILL.



STA-KOOL TOOL HOLDER

What makes a really fine tool? Proper design and construction, of course, as well as quality of material and workmanship, plus the maker's integrity. JKS Diamond Tools are designed to meet all production problems, but it frequently happens that special conditions call for special treatment. In such cases we make a study of these conditions, preparing a JKS Diamond Tool that will stand up to the most exacting tests. You may add our experience and fac. ities to your organization by telephoning our nearest district office. This will bring prompt response and wholehearted coöperation.



screw machine bushing and welded in assembly and included with part "E". similar part "F" was welded to "E". This meant considerable saving and a more accurate job as to tolerance, and by using a special alloy sheet, greater strength was assured in the final assembly. It should be remembered that only three or four hundred of these units were produced a year, but under the short run process, developed by Dayton Rogers Mfg. Co., 2847 12th Ave., So., Minneapolis (7) Minn., the blanking tools were produced at minimum cost, and after checking it was found that the blanking and piercing dies cost less than the pattern, drill jigs and milling fixtures used in producing parts "A", "B" and "C". It was afterwards found that larger production was required, and the preceding development work proved a good basis for building permanent tools, lending the job to mass production, which was considered prohibitive by casting methods.

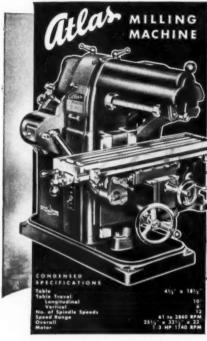
TOOL STEEL TUBING



Since the beginning of World War II, tool steel tubing has come into wider use as a result of pressure on manufacturers to reduce tooling time and speed war work. A common use of tool steel tubing is in die making, where it can be utilized in many ways.

The die shown, for instance, is made of four different sizes of tool steel tubing. In portion of die shown at left, outside section of tubing is the blanking ring, middle section is the pressure pad, and inner section is the draw stake. In portion of die shown at left, one section of tubing was used to make a blanking and drawing ring.

Sizes of tubing used in this die range





Precision Paves the Way to Tokyo

Sharper shooting . . . closer bombing . . . greater speed-that's our edge on the Nips! And the precision that makes it possible begins on American production lines where less than a thousandth of an inch is a sacred thing to Uncle Sam's crack machinists.

In production plants throughout the country and in the mobile machine shops of our armed forces, Atlas machine tools are helping make and keep our fighting weapons on top. The Bench Milling Machine is one of the Atlas tools for small parts work to relieve large machines for larger jobs in plant after plant. This compact modern tool handles all milling operations with split-hair precision,

Speeding production for quicker Victory, the Atlas 4 Tool Team will be a potent profit-making combination after the war. Put it to work boosting production now . . . use it for quick conversion later! Write for full details and address of our nearest representative. ATLAS PRESS COMPANY,

550 North Pitcher Street, Kalamazoo 13D, Michigan.













Automatically opens at a predetermined length of thread.

Instantly withdrawn from stock without reversing machine.

Instantly set from a rough cut to a finish cut of thread.

Button dies quickly changed.

Less set-up time. Low cost.

Accurate speedy thread cutting is assured with these DIE HEADS. A wide range of capacity of each size die head means a small investment, and makes this modern DIE HEAD the ideal general purpose thread cutting tool. For tough threading jobs where constant uninterrupted operations are essential, the BHICO DIE HEAD will do them.

No fussy adjustments to be made: Dies removed by loosening of two screws.

In ordering BHICO DIE HEADS, specify DIE HEAD size and diameter of shank.

Ask your Dealer or order direct.

Write For Details, Circular C-1

B-H INSTRUMENT CO.

3321-23 AVENUE S BROOKLYN 10, N.Y.

from 14 to 10" O.D. The die blanks and forms small heater tops out of 20-gage cold rolled sheet in a single operation.

If tool steel tubing had not been used, die would have been made by forging rings to size and then machining them. In smaller dies, particularly with a deeper draw, the only other method would be to bore solid bars, which is expensive and

a time-consuming procedure.

Tool steel tubing is most commonly substituted for bored bars in manufacture of blanking dies, forming dies, punches, collets, collet closers, spindle thrust collars, lead screw thrust collars, rim rolls, hardened rolls, master tools, ring gages, bushings, slitters, spacers, skiving knives, machine tool parts and many other tools

and parts.

The practice of boring solid bars to obtain a simple tubular part made of tool steel is wasteful in more ways than one. For instance, suppose a tool steel bar 6" in diameter and 1' long is bored into a tube with 1" wall thickness. The equivalent of a 4" bar is simply swept up as scrap, having been bored out of the bar. If the steel costs 40 cents a pound, waste in cost of material alone (estimating weight of a 4"x1' bar of tool steel to be 43 pounds) is \$17.20. Labor involved would in most cases cost even more, to say nothing of loss of time and manpower, and cost of tool bits, machine maintenance, power, etc.

To make a part of tool steel tubing, it is only necessary to select the proper size of tubing, saw off the desired length. and then make any machining operations which are necessary to give tube the contours required by the job. For additional information, write The Bissett Steel Co., 945 E. 67th St., Cleveland, O.

CUTTER CONVERSION

A new 12-page bulletin No. M-1296 has been issued by Cincinnati Milling Machine Co., Cincinnati, Ohio. It is a reprint of two articles dealing with advanced meth-

ods in cutter sharpening.

The first of these articles is devoted to the grinding of milling cutters with resinoid bonded wheels and the author is J. E. Rogers, Abrasives Consultant, Toronto. The second article covers the making of carbide tipped flat boring cutters. Copies will be send free, on request.

ROLLED JOURNALS

Because he recalled having seen a job handled similarly while serving an apprenticeship in a locomotive shop some years ago, Ira Santy, a machine operator at General Electric's Pittsfield Works was able to suggest a way to do a difficult



I OU cannot afford to take chances with unreliable checking and measuring equipment—particularly surface plates. The depleting ranks of skilled help emphasizes the importance of providing the men you now have with the best surface plates available.

Precision cannot be maintained unless you have reliable measuring equipment. Countless manhours are lost in correcting errors for which manpower should not be blamed. Machine Products Corporation Surface Plates of Meehanite iron are used and preferred by the largest manufacturers in the country. We'd like to tell you why.



GIRLS CAN OPERATE

NEW Rouse HAND MILLER FOR SMALL PARTS



One of the ROUSE Fixture Set-Ups the

The Rouse Hand Miller is a versatile, efficient, high-speed ball bearing machine for handling light cuts in brass, aluminum and steel.

Rouse Fixture Set-Ups make the Rouse Hand Miller readily adaptable for accurately milling small parts for planes, radios, electric motors, and similar equipment. Spindle will take milling cutters or end mills.

Prompt delivery can be made. Send for circular.

H. B. ROUSE & COMPANY 2214 N. Wayne Ave., Chicago 14, Illinois job without a special-purpose grinding machine otherwise necessary.



Santy suggested that the journal of a 2500-lb generator rotor could be rolled instead of ground when other diameters of the shaft were ground, the previous method which was resulting in a number of rejections due to excessive runout. Runout on diameters and faces must not exceed 0.0002". He devised a simple rolling tool for the job. The method he suggested minimizes rejections, and the hardened roller of the tool provides a denser and consequently smoother surface than could be obtained by grinding. The journal is rolled in the same lathe in which it is turned. Because the shaft is kept on the same centers for both operations it is easier to hold all diameters concentric.

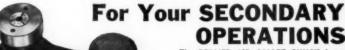
CENTER LAPPING POINTS

To meet the extremely close tolerances demanded in thread grinding and "O.D." grinding operations, Bay State Abrasive Products Co. has developed "Blue Flash" center lapping points for use on Ex-Cell-Ocenter lapping machines. Construction features are the same as Bay State mounted wheels and points.

These center lapping points are said to need none of the usual "breaking-in" for Bay State manufactures them in blank form, then shapes, trues and sizes them after mounting on the mandrels. This is in contrast with ordinary methods of pressing them into shape. The finished product is sharp, smooth-running the instant it is applied, without hard or soft spots and no need for dressing.

Like Bay State mounted wheels and points, the grit of these lapping points is fitted to the grind. Different bonds and

Speed Economy Accuracy



The REDMER AIR COLLET CHUCK is a precision holding fixture using standard B & S type screw machine collets. The collet remains stationary, thereby eliminating the possibility of variance in the depth of drilling, milling, reaming and other operations, os experienced with draw-in or push-out types of collets.

Available in four models having a range from 1/16" to 13/4". Prices and demonstration upon request.

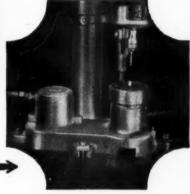
OPERATION

Milling slot in plunger. Former method: Milling machine and hand vise. Present method: Milling machine and Redmer Air Chuck.



OPERATION

Tapping stainless steel. Former method: Drill press reversing tapper and hand vise. Present method: Redmer Air Chuck drill press and reversing tapper.



REDMIER

AIR DEVICES CORPORATION
603 W. Washington Blvd., Chicago 6, III.

Formerly RED-E-AIR CHUCK CO.
NO CHANGE IN MANAGEMENT



A BLADE TO MATCH YOUR JOB IN AN EASIER-TO-HANDLI FRAME

Here is a practical metal-sawing combination with two VICTORS —a blade and a frame—each helping you to achieve the best results.

A chart packed with each frame and blade unit gives easy-to-follow tables for proper blade selection with hints on proper blade use. It will help new, unskilled employees to do faster, better metal sawing.

VICTOR BLADES FOR POWER SAWING, TOO

are described and illustrated — along with all VICTOR products including band saws — in "Metal Cutting", a fact-packed, helpful booklet which will be sent you on request.

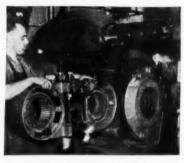
VICTOR SAW WORKS, INC.



Makers of Hand and Power Hack Saw Blades Frames, and Band Saws. special treatments are available, and the mandrels have heavier, deeper knurls to provide more binding surface for the cement—insurance against the points coming off the spindle.

The lapping points are available in all regularly required sizes and specifications, mounted on ½" mandrels.

FIXTURE SIMPLIFIES HANDLING



In the internal bore grinding of Tri-Clad motor stator cores at General Electric's Lynn (Mass.) River Works, this special pivot-type, easily handled fixture greatly reduces the time and effort spent in handling cores to and from grinder. Another advantage of the fixture is that it can be loaded and unloaded during the grinding cycle.

In the illustration, operator has just pivoted the fixture. Stator core on the left is completed, and the one on the right is being swung in between machine clamping rings. After this stator core has been secured in machine, fixture will be swung back and grinding operation started. During grinding, the completed stator is removed and replaced with an unground one. Other part of the fixture remains empty so that it may be used to unload stator being ground.

DELTA BLUE BOOK

A new 76-page "Blue Book for Management, Shop and Production Engineers," issued by The Delta Mfg. Co., 620X E. Vienna Ave., Milwaukee 1, Wis., presents the case histories of 140 special-purpose machines—built speedily and with great savings in first cost and in fixed charges, to expedite war production.

These ingenious designs, employing standard Delta drill press heads and columns and other low-cost Delta tools, are almost entirely the work of production

HOW TO GET THREAD MILLING CUTTERS

STOCK BLANK

NUMBER

giving Pitch and Thread Form desired

DETROIT

STANDARD STOCK BLANKS MEET 90% OF ALL THREAD MILLING CUTTER REQUIREMENTS

22 21/2	12 1 1 14 1 14 1				SH	AN	IK	TY	P	8		
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FOR STANDARD STOCK SIZES, ASK FOR BULLETIN No. CB-43



8432 BUTLER DETROIT 11 MICH. U.S.A.

217

Resharpen **Dull Taps**

Easily! Quickly! Accurately!



READING TAP GRINDER

Can be used on almost any type of tool and cutter grinder, surface grinder — even bench lathes. Tap is held in chuck — may be sharpened after center is destroyed. No collets. Complete. No extras. Write!

· Built-in chamfer

protractor. Simple shifter for

2-3-4 flute taps. relief thru adjustment screw. Easy - to - follow chamfer diagram

on index plate. · Capacity to 34" hand tap.

ORDER NOW!

Also manufacturers of

READING BROACH KEYSEATER

The Reading Bench Machine does not require bushings or quides. No other machine like it. Very fast capacity from 1/6 to 3/6 cutter. Low first cost - prompt delivery.



READING

READING (CINCINNATI) OHIO

men in the various well-known plants which originated them. Readers are referred to original sources for further de-



Production increases from two to six times are reported in many instances, without the expense and delay of creating large, costly special machines which would be useful only for a given operation.

The examples illustrated and described, cover a wide variety of operations on metals, plastics, and wood.

PIERCING MACHINE SPEEDS TRIM



A pneumatic piercing machine, designed and built by the American Central Mfg. Corp., Connersville, Ind., has speeded the accurate trim of stamped collector ring sections prior to welding. Applied to junc-

A secret in "wringing"!



● It is a not too closely guarded secret. The U. S. Bureau of Standards (see Scientific Papers of the Bureau of Standards, No. 436, Part of Vol. 17, P. 691, "Interference Methods of Standardizing and Testing Precision Gage Blocks") has stated explicitly that in making accurate calibration of gage blocks, the error introduced by oil or other film should be eliminated.

Certainly, it is a demonstrable fact that if such film is used in wringing gage blocks, some impairment will result in the extreme accuracy of measurements made by the blocks and in their wringing qualities.

Write for FONDA'S bulletin, "Precision in Millionths," which tells of the new "ULTRA-FINISH" that makes the use of oil or other films unnecessary in wringing FONDA Gage Blocks.

FONDA'S advanced methods in gage block manufacture have made FONDA the choice in many vital plants and laboratories, for critical precision measurement.

PASSED
HIGHEST TESTS
DEVISED BY
NATIONAL
BUREAU OF
STANDARDS

PROMPT DELIVERIES



Write for Bulletin F

GAGE COMPANY

MFRS. OF FONDA GAGE BLOCKS

175 FIFTH AVENUE, NEW YORK . FACTORY - STAMFORD, CONN.

Agents in all principal cities throughout the World

Accuracy

BEGINS AT THE BASE WITH LEVELING JACKS

Scientifically designed leveling jacks for any equipment which demands ex-



Standard Size No. 100A (base 6 x9, average height 234", top section 4"x434") will fit most requirements.

Extra large base & screw assures permanent accuracy. Angular faces are finished.

SPECIAL SIZES SUPPLIED ON REQUEST



2305 Hilton Rd., Ferndale, Mich.

ture of a port branch and the main ring. where a saw cannot turn, the piercing machine punches out a perfect radius while maintaining a 3/32" edge flash for welding purposes.

Ten tons of pressure applied to a standard wave cut punch pierces the .050" stainless steel used for collector rings. A spring stripper which clears punch also acts as a gauge to insure an even flash edge margin.

JESSOP CARBIDE TOOLS



Rounding out their service for the metalworking industries, Jessop Steel Co., Washington, Pa., recently announced a new line of "Malta" Carbide Tipped Tools. The line is quite comprehensive and includes cemented carbides for the cutting

cludes cemented carbides for the cutting of steel, cast iron, non-ferrous and non-metallic materials.

There are 10 different styles in the new Jessop line of "Malta" Carbide Tools, embracing a wide range of sizes. Three grades of tips are included, viz., "MF" for miscellaneous finishing, "SF" for steel finishing and "CR" for coarse roughing.

The three grades are identified by color-The three grades are identified by colored shank ends. Thus, the "MF" line is marked with red, the "SF" with white and the "CR" carries a blue identification to insure proper grade selection. Tools are rust proofed to permit safe storage over long periods.

Known as the "JC" series, Jessop Cathide Tools are deletion better the mill

Carbide Tools are stocked both at the mill and in warehouses.

An attractive, new bulletin presents further details.



Photo above shows Jefferson Turrets on 16" lathe



71/2" Swivel Base Dividing Head - In Stock IMMEDIATE DELIVERY No Priority Required

Convert YOUR ENGINE LATHE INTO A TURRET LATHE IN 15 SECONDS

Yes, it's as easy as that!
You simply attach the
Jefferson Tail-Stock Turret, the Jefferson
Tool-Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in

The productive capacity of these machines will be more than doubled in many instances because there will be available at all times NINE DIFFERENT TOOLS.

With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, ing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe, or changing tools. THE JEFFERSON TURRETS

are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24" swing. Jefferson Turrets are real production tools— sub-stantial, rigid, accurate and adaptable to any size or make of engine lathes. They must not be confused with the small makeshift gadgets now on the market.

PAT. PENDING

5-Tool Tail-Stock Turret



6" Tilting Dividing Head with 3 Index-ing Plates and Tailstock— Immediate Delivery.

Some territories still open for dealers and salesmen.

TURRET DELIVERIES IN 6 DAYS

700 W. Fourth St.,

MACHINE TOOL CO. Cincinnati 3. Ohio

Tool-Post Turrets, Tail-Stock Turrets, Adjustable Pull Feeds, Belt Sanders, Gyratory Foundry Riddles, Overhead Swing Frame Grinders, Milling Machines, Dividing Heads and Vises

SHIFTER FORK GAGE

John E. Lawrence, instructor in a mechanic shop, Quartermaster Replacement Training Center, Camp Lee, Va., recently developed a gage for speedy and accurate checking of the alignment of shifter forks of Army vehicles.

Previously, an expensive, complicated dial gage was used, which required a great deal more inspection time than the new fixture.

The new device is made up of three parts. It can be made from scrap metal by soldier-trainees in the Army machine



M & L PRECISION TAPPER

Taps guided by precision leads, Class 3 & 4 specifications easily met. 4 speeds, Ball bearings throughout. Available as floor model (with coolant system) or table model: also automatic air stop for bottom tapping.

International Inside Micrometers

Highest accuracy and finest workmanship. Available 11/2"-6" & 11/4"-12" sets.



Brand Telescope Gages 5/16"-21/a' Handy Knurler, useable drill press or lathe.

BRAND TOOL & SUPPLY CO. 500 W. Washington Blyd., Les Angeles 15, Calif.



shop. There is little wear-and-tear on the gage and any mechanic can use it. It gives a positive check on the straightness of the shifter forks.

Army trucks are not easy vehicles to drive. Often the operators slam the gears, thereby bending the gear shifter forks. If forks are not straightened, new gears will be required in a short while.

The Lawrence gage is typical of hundreds of improvements in tools, testing devices and even motor parts that are being developed daily by civilian instruc-

The illustration is from an official U.S. Army photo.

LINE COMPRESSOR ASSEMBLY

An outstanding production development



6 DAYS DELIVERY

THREAD MILLING CUTTERS, CLASS 1, 2 OR 3 FIT, COMBINATION FORM CUTTERS

INVOLUTE SPUR GEAR CUTTERS, 141/2° AND 20° P.A. Send Blueprints and Specifications

U. S. MACHINE TOOL MFG. CORPORATION CLINTON, INDIANA



IT'S THE 2-in-1 WHEEL

The same Por-os-way wheel—at a deeper cut—can often be used for rough grinding as well as finishing.



THIS MAKES THE DIFFERENCE

It's easy to see the difference between an ordinary wheel (top) and a Por-os-way wheel(bottom). Por-os-way's extra porosity results in over 8 distinct operating advantages.

*T.M.Reg.U.S.Pat.Off.

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CHECK FOR CHIP CLEARANCE

Grinding wheels, just as twist drills, need clearance. Por-os-way's structure provides chip clearance NATURALLY.



Por-as-way Users List Reads Like a Blue Book of American Industry, A few are:

E. C. Atkins & Co. · Bell Aircroft · Edward G. Budd Mfg. Co. · Buick Motor Division of General Motors · Kinner Motors, Inc. · Studebaker Corporation · Thompson Aircroft Products · Wadell Engineering Co. · Westinghouse Ele

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POR-OS-WAY

A. P. DESANNO & SON, INC.

442 Wheatland St., Phoenixville, Pa., Since 1893 New York - Pittsburgh - Cleveland - Betroit - Chicago - Los Angeles

Radiac POR-OS-WAY - Radiac PARAFLEX - Radiac Mounted Points and Mounted Wheels - Radiac Internal Grinding Wheels Radiac Abrasive Cut-Off Machines and Discs

The Bendix Vernier Caliper

(A Lafayette Tool)

TOTAL LENGTH: 8 INCHES

SCALES: 1/16 with Vernier: 1/128 in. .025 in. with Vernier: 1/1000 in.

Net Price \$10.75

HARDENED MODEL Net Price \$16.00

NEW YORK, N. Y.

MEASURING CAPACITY 5% In 4 Measurements: Outside, Inside, Depth, and Depth of Threads.

SEND FOR OUR CATALOGUE.

LAFAYETTE TOOL & SUPPLY CO.

178 LAFAYETTE ST.

Mt. Vernon, Ohio and Grove City, Pa. This firm has set up a production line system designed to speed up and facilitate assembly of huge 56-ton compressor units. Said to be the only assembly line type.

Said to be the only assembly line type of production ever attempted for turning out engines of this size, the idea was conceived and put into effect by Robert Humphreys, superintendent of engine erection and testing for the 111-year-old engine building firm.

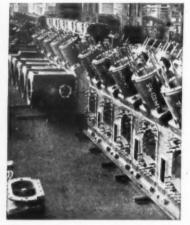
Construction consisted of embedding steel tracks in erecting floor and mounting steel skids on engine bases so the huge units can be rolled from station to station.

As compared to conventional methods of assembly, this arrangement permits locating various component parts of the company's type GM-V compressors at selected areas along the line, thus eliminating much of the work formerly done with overhead cranes and by hauling.

"With this method," said Humphreys, "we roll the engine to the parts instead of transporting parts to the engine."



Here is a good trick for cutting flat belts. Apparently the method is not known to many belt users as it is not



which typifies the ability of American workmen to overcome unusual wartime conditions was disclosed recently by officials of The Cooper-Bessemer Corp.,

Bellevin

FIELD ABRASIVE SPECIALTY MFG. CO.

FLEXIBLE ABRASIVE WHEELS

Designed for precision work where flexibility is required, these wheels are useful accessories for sending and finishing regular and irregular jobs, penetrating into difficult recesses, lopping holes in dies, finishing various shapes of metal, wood, rubber and plastic parts.

Useful for finishing propellers in aircraft construction. Descriptive bulletin and sample wheel will be sent on request. Prompt Deliveries.

> 203 LOWE BLDG. DAYTON, OHIO



Now you can equip every machine tool for higher production with a compact, portable, low cost Atlas Coolant Pump—screw machines, lathes, drill presses, milling machines, cut-off saws. Cuts tool wear, cuts rejections for poor finish. Powerful centrifugal type pump handles any cutting fluid; flow is adjustable from drip to stream. Two models, universal or induction motor, handling 450 and 225 GPH. Feed lines are durable, tough

extruded plastic. Ask your Atlas distributor for full details about Atlas Coolant Pumps or write us. Ready for immediate delivery.



ATLAS PRESS COMPANY

5 5 0 N. PITCHER ST., KALAMAZOO 13D, MICHIGAN

LATHES • DRILL PRESSES • ARBOR PRESSES • SHAPERS • MILLING MACHINES

DRILL GRINDER

Anyone can do expert drill grinding with this simpleto-use drill grinding attachment—fits on any beach grinder—saves buying new twist drills—saves time



SETTING THE PACE ON EVERY PRODUCTION FRONT Saving 90% of clamping time—new designs for high speed production work, one hand operation. Non-creep replaceable grips, proof-tested alloy steel construction of force of the production work on the production work, one hand operation. Non-creep replaceable grips, proof-tested alloy steel construction of force of the production of the production

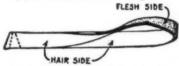
malleable iron and alloy steel:
Our new 32-page catalog illustrates and describes these production clamps in detail. A copy is yours for the asking.
Write today.



3132 W. Grand Ave. Chicago, III.

published in belting manuals or elsewhere.

The "old method" when cutting a belt is to use a square and make the cut "absolutely square" with the sides of the belt. However, if done in the manner sketched here, it is not necessary to make the cut square. The most important thing simply is to make the cut "straight".



To do this, give the belt one turn as shown and lay the ends, one exactly over the other, in perfect alignment. Then, by making the cut "straight" even tho not square with sides, it will be found that the ends will make a perfect fit. The cut may make various angles as indicated by the dotted lines and by the angular cut shown in the sketch. The angle makes no difference.

To be sure, it usually is best practice to cut the belt square, or as nearly square as possible. By cutting it square, belting material is more likely to be saved than when cut is angular. But to be doubly sure about it, even if a square is used, it is an excellent safety measure to give the belt one turn as recommended here and then if the square itself is not true, or if an error has been made in one way or another, the error will be automatically rectified.

WELDED BELT HOLDER

(Data and Illustrations Courtesy The Lincoln Electric Co., Cleveland, O.)

Ways in which stockroom space may be conserved and stockkeeper's duties simplified by the arc welding process are common among factories of all kinds and sizes.



The only extended base clamps. Drop forged for strength. Positive lock unaffected by pressure and vibration for quick, easy use. Write on your firm letterhead for further and more complete information.



PRODUCTS ENGINEERING COMPANY

FOR HOLDING GRINDING WORK

Magne-Blox laminated parallels and V-Blocks can be furnished in special sizes and forms to hold various types of work for surface grinding that may now require complicated clamps and holding devices. With Magne-Blox, you simply set the work in place and proceed with the grinding. Investigate!



MAGNE-BLOX SETS FOR IMMEDIATE DELIVERY

Now available for immediate delivery are our standard Magne-Blox Parallels and V-Blocks in the following sizes. They will quickly save their cost by simplifying difficult set-ups.

Set large Magne-Blox Parallels, 1" x 3" x 73/4"	\$29.50
Matched double pair of above (4 pieces)	\$59.00
Large Magne-V-Blocks, 134" x 238" x 334"	\$26.50



Write today for our new 8 - page folder entitled "Time Saving Devices for the Grinding Room." This pamphlet contains informa-

> tion that every grinding room foreman should have.

GEORGE SCHERR COMPANY, INC. 122 LAFAYETTE ST. NEW YORK 13, N. Y.



One of the easiest ways to store belts for drives and shop machine use was exemplified at one mid-western plant where a novel method is employed to store stock belts.

In order to keep the belts out of the way and conserve stockroom space, this plant devised a welded rack suspended from the ceiling beams which permits quick visual selection of the belts needed and requires a minimum of space and effort to supply the parts as required.

A 11/2" pipe was welded at the end to the ceiling "I" beam as shown.

Lengths of ½" diameter round stock were then tack welded on each side under the pipe and bent slightly upwards at each end.

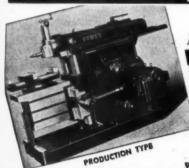
The various sizes and types of belts are stocked on each side by merely looping them over the protruding pegs as shown. The belts hang about seven feet from the floor, out of the way, and are easily lifted off the pegs by means of a length of 1" conduit to which \(\frac{1}{2} \)" round stock has been welded to serve as a hook.

upwards at

CUTTING BARRITT

A power-driven saw designed and built at General Electric's Pittsfield Works, speeds and simplifies the operation of cutting the babbitt in bearing linings for large motors. The cut is made from the inside after the babbitt has been cast into the bearing lining, separating it into halves.

Matched for the Job!



EEMED

Multi-Purpose SHAPERS

PLAIN TYPE

A fast utility machine for a wide variety of the average shop work and for training purposes in industrial schools.

PRODUCTION TYPE

Massively
constructed with a large table to handle medium
heavy work on a peak production basis with high
limits of accuracy

UNIVERSAL TYPE

Ideal for tool and die work, experimental laboratories and model shope or where angular work set-ups are required.

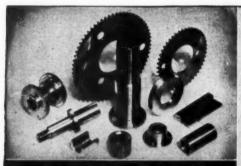
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Immediate Deliveries on Firm Orders!

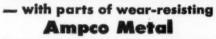
GENERAL ENGINEERING & MFG. CO.

LOUIS 4. MISSOUR

Manufacturers of Precision Equipment



Leading machine-tool builders protect you against failure at critical points...

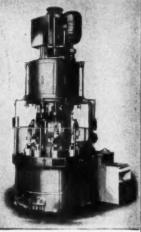


Check for this protection, when you look at the specifications of machines you buy — for you know that the name "Ampco" stands for longer life, several times that of ordinary bronzes. This remarkable alloy of the aluminum bronze class has been adopted by over 90 leading machinetool makers — where they need exceptional strength, hardness, or resistance to wear, shock, and fatigue. Be sure you get it on new machines — replace worn parts of your older machines with durable Ampco. Write for catalog.

Ampco Metal, Inc.

Department MT-5

Milwaukee 4, Wisconsin



Ampco Metal Parts in the Bullard Mult-Au-Matic Bullard machines, built by The Bullard Company of Bridgeport, Connecticut, in-

Bridgeport, Connecticut, include over 60 different parts of Ampco Metal — a mark of progressive engineering.



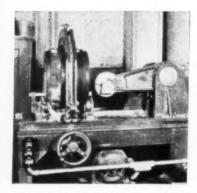
The Metal without an Equal



Ask the nearest Ampco field engineer to study your maintenance requirements and suggest an Ampco Metal stock list to meet the specific needs of your Maintenance Department,



Sidney 16-speed model beavy-duty engine lathe. Headstock equipped with center bearings and 14 gear bushings of Ampco Metal.



A rotating cradle holds bearing in place for the cut. The bearing is rotated until one of the slits for dividing it in two is lined up with the saw by means of a bar guide. The rotating cradle is mounted on slides, enabling operator to feed the bearing into the saw by means of a hand wheel.

The saw is arranged with a gage which

allows it to cut to the desired depth, thereby just cutting thru the babbitt and not into the steel bearing itself. After the first cut is made, the piece is revolved and the operation is repeated.



Substantial reduction in time required for the operation results from the fact that the clamping mechanism for holding the bearing is quickly applied, and rota-





BUY WAR BONDS

WHAT a different story, perhaps, had our pre-war planning been as anticipated as post-war planning! Yes, today foresight is replacing hindsight. Eyes are looking forward... visions of a postwar world are taking concrete form. And one of these days you'll be glad you thought first of things which today are last.

UNITED STATES ELECTRICAL TOOLS

today for war . . . tomorrow for peace

PRECISION LATHE GRINDERS



Model XX

For external or internal grinding. Ball bearing grinding wheel spindles are interchangeable on corresponding sizes. Adaptable for use with lathe, planer, boring mill, milling machine, etc. Can be used in vertical or horizontal position. Spindles equipped with match precision ball bearings, enclosed in dustproof housing.

Reasonable deliveries. Write today.

The UNITED STATES ELECTRICAL TOOL Co.

Outstanding For Fast, Accurate Milling and Jig Boring



The Linley machine has won the sincere approval of countless toolmakers for its ability to "keep the decks cleared" in busy shops. What it is now doing in war plants will be continued under civilian production later. It's a machine worthy of investigation . . . for relief of larger machines, too often expensively scheduled for small work.

The 8 spindle speeds to 4250 r.p.m.; its rigid and compact construction, fast

set-up and quick changeover, velvet feed and precision production . . . warrant consideration by any shop . . . insure time saving and definite cost reductions.

SEND FOR BULLETIN . . . NOW

LINLEY BROS.

663 STATE ST. EXTENSION BRIDGEPORT 1, CONN.

tion of the bearing is made easily without the use of a crane. Moreover, control of the cut is absolutely accurate.

The saw is driven by a 1-hp motor through a gear drive.

NEW BOMB?



The streamlined projectile-like contraption George Pfau, General Electric tool maker, is assembling may look like a new secret bomb, but actually it's a new "tailor-made" motor destined to help make our bombers more effective. One of several, General Electric is now building, this small motor will serve as the "engine" driving the propeller of a small model plane operated in a large wind tunnel under conditions equivalent to those of actual flight.

Motors for model planes must be powerful and compact, since mounting space is very limited. This motor is only 5" in diameter and 13" long, yet it has a rating of 30 hp. It weighs only 57 pounds and while its rated speed is 6000 rpm, it can operate in excess of 7000 rpm. It is water cooled.

The small parts to the right of the motor comprise the tachometer assembly for determining the motor speed. This assembly fits front end of motor.

Thru the use of small model planes



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shipment.

Dowel pins in 163 standard sizes (plus oversizes) ground to exact diameters, carburized, hardened and tempered to case hardness Rockwell C. 60-62 effective to depth .020" and core hardness Rockwell C. 50-54.

Standard and Special die sets in all sizes.

DETROIT DIE SET CORPORATION 2895 W. GRAND BLVD. DETROIT 2. MICH.



operated in wind tunnels, the preliminary designs of new planes can be studied in miniature in the laboratory while the plane is still "on the drafting board" saving lives and the expense involved in full scale actual flight testing. Wind tunnel testing is a decided improvement over early day procedure when the designer had to be his own test pilot—and only the able and careful survived.

ELECTRONIC PRODUCTION AID

Machining operations involving irregular surfaces, such as propellers, dies and cams, have in the past often required expensive and time-consuming hand labor—chipping, grinding, polishing. As might be expected, the final result was not always as exact as it might have been.

A new tracer mechanism, with the Westinghouse Silverstat regulator as its operating medium already has been applied successfully to several such operations. In operation, a probe, mounted

in connection with the Silverstat, is used to follow the contour of an accurate model—either actual size or to scale. As

RECTRONC

AMPURER

O. C. GER.

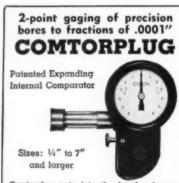
A. C. MOTOR

O. C. FEED MOTOR WHICH
MOVES CUTTER HEAD UP
AND DOWN

CUTTERHEAD ON

A. T. MATERIAL

probe is moved across model, it affects the position of the Silverstat. Thru an electronic amplifier, the cutting tool is



Comtorplug puts into the hands of your operators, inspectors, trainees a practical means of gaging holes to fractions of .0001". Accurately indicates size, out-of-round, front or back tapers, etc. Completely dependable, even in comparatively inexperienced hands.

REQUEST BULLETIN 29

THE COMTOR
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UK CO. Waltham, Mass.



For every service, 1/50 to 400 h.p. Wide range of ratios. 1944 precision standards. Compact, sturdy for severest duty. Send for Catalog.

ABART GEARS cut to specifications.

Send B/P for estimate.

About GEAR & MACHINE CO.



Designed for the Production Line

CP Universal Electric Tools are built to "take it"—with powerful, high torque trouble-free motors. "Straight-Line Airflow" ventilation makes the motors particularly cool running. Heat treated helical gears and ball bearings throughout make CP Universal Electric Tools silent as well as enduring. Every feature of their design is calculated to meet long continuous service—truly production line tools.

The drill illustrated is the CP No. 806 "Midget"—ideal for close quarter drilling jobs up to ¼".

In addition to Drills, CP Universal Electric Tools include—a long line of Reamers, Tappers, Screw Drivers, Nut Runners, Grinders, Sanders, Buffers, Flue Rollers, Hammer Drills, Scalers, Files. For complete information, write for Catalog No. 893.

東京東京東京 PMEUMATIC TOOLS ELECTRIC TOOLS (Microle...Universal) ROCK DRILLS CHICAGO PNEUMATIC

市市市市市市市市 AIR COMPRESSORS VACUUM PUMPS DIESEL ENGINES AVIATION ACCESSORS moved correspondingly with respect to the work.

The accuracy of the tracer mechanism is such that, with a well designed machine tool and an actual size model, contour of model can be duplicated within two or three thousandths of an inch when feed speed of 20 to 30" per minute is used.

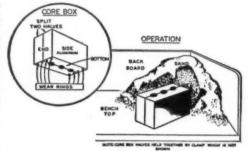
The schematic drawing illustrates operation of the tracer mechanism using a full scale model. As probe A moves up and down in passing over model, cutterhead is moved correspondingly by its feed motor, which is controlled by the electronic amplifier.

By G. A. Caldwell, Engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CARBIDE FISHPOLE GUIDES PROLONG CORE BOX LIFE

A recent example of savings which can be effected by substitution of a small amount of tungsten carbide for other materials exposed to wear (caused by rubbing or abrasion) comes from an Ohio foundry. Here, eluminum core boxes—made in halves and held together by clamps—are used. (See accompanying sketch). After a box has been filled with core sand, and sand is rammed down into box, box is rubbed over bench top to smooth off bottom.

Rubbing over bench top covered with highly abrasive





MANY KNURLINGS FROM STRAIGHT KNURLS

ADJUSTANGLE KNURL HOLDER



Made to fit your turret, this Holder uses the same pair of straight knurts to produce many patterns, by varying the angle of adjustment. Capacity up to 2½" work diameter.

Request Illustrated price circular.

GRAHAM MFG. CO. 52 Bridge St. East Greenwich, R. I.







Check the Features against conventional type cutters:

- Leaves a finish comparable to that secured by grinding.
- grinding.

 Takes a large cut with ease...its production limit is determined only by the horsepower of the
- Removes metal from two to ten times faster than conventional cutters.
- Does not dig in or chatter.

milling machine.

- Takes a curl chip like a lathe tool. The chips slide back of the cutting edge, tending to sharpen the tool as it is used.
- Circular cutting bit slices metal with a true, knife-like, Shearcut action.
- Lasts from 10 to 30 times longer between regrindings than ordinary milling cutters.
- grindings than ordinary milling cutters.

 May be resharpened in less time than it takes to remove a usual milling cutter head from the
- machine.

 Eliminates necessity of grinding, filing or polishing as no tool marks need be left on work.

SEND YOUR ORDER WITH PRIORITY RATING TODAY!

Stock sizes: 3" to 18" inclusive. Special Cutters 20" to 60" made to order.
Immediate deliveries on stock sizes.

SHEARCUT TOOL CO.

362 S. MAPLE DRIVE, BEVERLY HILLS, CALIFORNIA

PATENT WARNING: All tools many tactured by Shearcut Tool Co. are protected by patents, patent application and patents pending. Intringemen will be vigorously prosecuted.

OLIVER OF ADRIAN



DIE MAKING MACHINES

The cut illustrates an Oliver in the plant of the Magheliese Tool & Die Co.

"They find it the most efficient and practical machine for the purpose."

The Oliver is fast and efficient on all sawing, filing and lapping operations on Dies, Templates, Gages, cams, stripper plates, etc.

They save 50 to 60% of the labor over hand methods.

Equally efficient on production filing jobs.

Send for literature describing the line of Oliver Die Making Machines!

OLIVER INSTRUMENT COMPANY 1408 Maumee St., E. Adrian, Mich.

We also build Drill Grinders, Tool and Cutter Grinders, Face Mill Grinders, Template Tool Bit Grinders. core sand wore away bottoms of the boxes unevenly. This put such a strain on dowel pins used to line up the two halves of core boxes that in time the boxes had to be scrapped or overhauled, the life of an average aluminum core box being only about 1500 cores.

being only about 1500 cores.

The foundry obtained from Carboloy
Co., Inc., some fishpole guide rings made
from cemented carbide to withstand
wearing action of fishing wire, or sharp,
hard silk, fishline—a popular peacetime
use of carbides. These rings were attached
to bottoms of the core boxes so that the
hard abrasion-resisting rings, rather than
the comparatively soft aluminum took
the brunt when boxes were slid along.
The result was a big saving in time
previously lost while repairing boxes or

The result was a big saving in time previously lost while repairing boxes or making new ones, the carbide wear-proofed boxes producing 9000 or more cores before overhauling became necessary.

Thus, use of small amounts of cemented carbide at critical points made it possible to use a light, "soft" metal with all the wear-resisting advantages of a "hard" wear-resistant metal.

STUART'S "KLEEN-KUT"

"Soluble Cutting Oil At Its Best" is the title of a 20-page Stuart booklet, which discusses typical problems involved in the selection and application of water-mix oils. Among the articles included are:—"By What Yardstick Do You Measure the Ideal Soluble Oil?" "Antiseptics in Soluble Oils" and "Where Can I Use Soluble Oil?"

Another helpful article tells how to mix soluble oils for best results.

The booklet is liberally illustrated with photographs of machining operations and laboratory tests. For free copies write to D. A. Stuart Oil Co., 2739½ S. Troy St., Chicago 23, Ill.

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A generously illustrated, 32-page book-let, full of interesting data concerning tools and equipment used continuously in production with Neutral Baths is offered by The A. F. Holden Co., New Haven, 8, Conn. Many typical jobs are shown along with the installations and the booklet contains new information and suggestions whereby additional savings may be realized by users. Specifications are given for the different jobs and the data may prove helpful in connection with the handling of similar jobs. A helpful table of Bath Recommendations is included. Also data on Tempering Baths. A new development is also included — annealing of welded stainless steel tubing.

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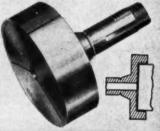
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Segmented collars expanded by downward pneumatic pull on tapered mandrels are production features of a complete size range of expansion machines designed and built for its own production use at the plant of American Central Mfg. Corp., Connersville, Ind.

Used to flare, size, and round collars of airplane engine collector ring sections in one operation, the expanders also can be used to produce beads and offsets.

Adjustments to within .001" can be made on the stops, and expansions of from .005 to 1/4"

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Distortion due to space between segments, sometimes used as an argument against sectional expanders, has been found to be negligible in these machines. Collars are machined to full expanded size, then segmented with a 3/32" milling cutter. This removes enough material to permit reduction to size suitable for easy



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End of mandrel is threaded into a trunnion block on pneumatic machine, and expander head slips into a collet. Ten tons

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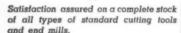


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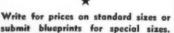
Here is just what you have been looking for. A High Speed, accurate Center Drill that guarantees a perfect center every time.

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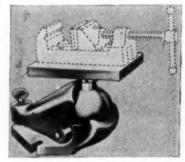
Galter Manufacturing Co.
711 W. Lake Street - Chicago, III.

of pressure on the machine, plus power developed by wedging action of tapered mandrel, shapes the stainless steel used for collector ring sections.

When a bead must be produced, advantages of these expansion machines over rolling a re especially marked. Rolled beads are almost never round and must be re-sized; in addition, they are very difficult to maintain at an even distance from end of section due to distortion of metal as the bead progresses. By contrast, expanded beads produced by these pneumatic machines are always of the right dimension and diameter, due to an even application of pressure simultaneously over entire circumference.

HOLDS AT ANY ANGLE

The Metro Positioner is a recently developed tool for holding or clamping work during production operations, such as checking, milling, drilling, shaping, boring, welding, filing, pattern making and similar work.



Your present vise or fixture may be bolted or fastened to the "Face plate" of the tool, which will then permit tilting the clamped work at any desired angle. The Metro Positioner operates on the ball and socket principle and is quickly released or locked in position by an easy turn of the conveniently located thumb screw. There are no graduations, the babbitt jaws give smooth operation and provide a rigid, non-slip hold.

Metro-Vise Co., with offices at 235 Stephenson Bldg., Detroit 2, Mich., now offer the Metro Positioner in two standard sizes:—The 4" size measures 7\(^4\)" high, has an 8"x11" plate and weighs 58 lbs. The 3" size measures 5\(^4\)" high, has a 4x6" table and weighs 30 lbs. Literature giving full details will be sent on request.

Motor End Shield Bearing Seats Precision Bored on

STOKERUNIT SIMPLEX Precision BORING MACHINE



Two bearing seats in motor end shield are precision bored in one operation.



End shield is located on face plate type fixture.

Profit with Stokerunit Versatility...

Over 25 versatile models of Stokerunit Simplex Precision Boring Machines are available to solve your precision boring problems. They cover practically the entire range of precision boring applications and can be furnished in mechanical and hydraulic feeds, with single or multiple spindles, for either short-run or production work.

For specific recommendations, send blueprints of parts with production requirements. No obligation.

Write Today for these two booklets covering details of our entire line of Simplex Precision Boring Machines.



The 2U is adaptable to a wide range of work.

Finish Boring Time 2 Minutes for Both Seats . . . Total Boring Length—234"

The two bearing seats in the end shield of this electric motor are precision bored on a No. 2U Stokerunit Simplex Single-Spindle Precision Boring Machine. Both are identical in diameter—3.6875". Length of bore on first seat is 11/2", on the second 11/4". As they are spaced 41/8" apart, a total spindle travel of more than 67/6" is necessary to complete the boring operation.

The total boring time of only 2 minutes for both bearing seats is made possible by rapid traverse of the Stokerunit Simplex spindle unit, which automatically provides quick approach to cutting position at each seat and quick return at end of machining cycle.

Additional Boring Data: Spindle speed 400 r.p.m.; feed 1½" per min. Tolerance on finish bore is -.001"; high finish is produced. Material is cast iron. Tungsten carbide cutters are used.

The face plate type locating fixture has multiple locating rabbets for holding various sizes of end shields. This fixture is also equipped with an adapter for holding various sizes of ball bearing cages up to 6" in diameter while boring the ball bearing seats.

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Diamond Millers have an enviable reputation for "getting things done" right! Built to the highest government standards, these Millers have made a name for

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themselves in many of the nation's largest plants. It will pay you to learn the full details—four models from which to choose.

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DIAMOND TOOL COMPANY, 3429 E. Olympic Blvd., Los Angeles, Calif.

Dealers in principal cities . Write for Bulletin

BOX MILL CUTTER GRINDING FIXTURE

With this new fixture any apprentice can grind tools to the rigid accuracy required for modern precision cutting.

The important angles are predetermined and ground accurately so that the cutter will be brought back to its original condition. This fixture is made of tool steel, hardened and ground to insure long life.

It can be used for grinding carbide tipped or high-speed cutters, and is designed for use on any surface grinder. One fixture may be used for all sizes of similar cutters.

The illustrations show the application of this new fixture in grinding the cutter for Warner & Swasey Single Cutter Turners. Similar fixtures are available for any of the well known makes of Turners.

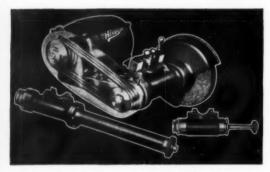
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The War Program has presented many manufacturers with grinding problems. No matter how well equipped a grinding department may be, a job will turn up which cannot be handled with the regular equipment. This is where HISEY Wide Range Precision Grinders step into the picture. Mounted on lathes, boring mills, planers, etc., they will do any internal, external or surface grinding operation. They are built for tool room accuracy with ruggedness and power for continuous production work. Size range from ¼ to 10 H.P. capacity in a number of different models.

WRITE FOR CATALOG No. 70E-H





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Leading War Plant Reports Sensational Results In This Accurate, Reliable Test

Drilling armor plate, a quota of 300 pieces prilling armor piate, a quota of 350 pieces per eight hour shift per drill press was established but had never been met. Two regular operators on identical drill Two regular operators on Mentical Grid presses, doing the same work, one using INSTA as the coolant, the other using

standard cutting oils were selected. BELOW ARE THE RESULTS OF ONE DAY'S RUN:

\$ 1.00 1.00 300 Rate (hr.) 75 8 hr. Production units . \$.026 Unit Costs - Labor . \$.106 0 Operation Stoppages . 18 \$ 8.00 (to replace or charpen drills) (To replace or sharpen aritis)
Labor Cost 300 Units . \$31.80 .75 8.75

Total Cost (300 Units) \$31.80 Saving with INSTA (300 Units) \$23.05

- · Increased Speeds and Feeds
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 - Reduces Rejects
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 - Amazing Increases In Tool Life

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"Hard to believe actual results."

Astounding." "Can't be done—but INSTA did it."

"Greatest time - saver ever used."

"Greatly increased our production

"Practically eliminated tool breakage." "The drill doesn't seize."

"Will save us thousands this year. "We advise INSTA for all

machining." "Your claims understated."

"Truly the vehicle for shop profits."

"Our men won't be without INSTA." "Worth many times its cost."

"Surely speeds up our war production." "Timely - we have long wanted something like INSTA."

"Our men proud of their increased production with

"Precision work fost." "Rejects cut to bone." Miraculous TRADE MARK REG

The "ingredient X", a newly discovered wonder-worker, com-pounded in the base actually eliminates static electricity—the cause of heat in metal to metal contacts. Particles of metal do not build up on the tool causing excessive tool breakage and wear. Tool and metal expansion greatly reduced. Resultprecision machining.

PROOF-Make this simple and convincing test in your own shop. Select a turret lathe from which turnings are blue or brown. Select of turrer forms which turnings are blue or brown. Push coolant spout to one side. Apply INSTA from bottle in generous quantities directly to tool point. THE TURNINGS WILL IMMEDIATELY TURN THE SAME COLOR AS THE METAL FROM WHICH THEY ARE BEING CUT AND WILL BE COOL.

Get This Generous Sample

The tremendous volume of requests for INSTA has forced us to make a small charge for generous sample of \$2 postpaid. Complete satisfaction or money back. Write or wire for quantity price and full information. Prompt shipments.

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ROUGHING WITH CARBIDES

By W. L. KENNICOTT*

THE term "roughing" is not very specific as it is used in metal cutting industries. Some of you undoubtedly have machining problems on small aircraft parts where a roughing cut is perhaps %" in depth. Others are confronted with the problem of machining medium size shell on which the roughing cut is approximately % or %" deep. To others, roughing cuts mean depths of from % to 1%".

For purposes of this discussion, we can divide roughing operations into three general classes:—light roughing (up to .150" depth of cut), medium roughing (.150 to .500" depth) and heavy roughing (.500" and more depth of cut).

Light roughing operations were perhaps the first class of machining to adopt Carbides extensively. Little or no modification of existing machines was necessary to apply Carbides, and the moderate strength requirements could be met by earlier types of steel cutting Carbide materials. With the further development of steel cutting Carbides, it has been possible to use grades in the higher hardness ranges because of this moderate strength requirement, and thus obtain longer tool life between grinds.

In production for the war effort, Carbides have been used extensively on light roughing of parts such as small arms and ammunition, small parts for aircraft, engines, machine guns, etc.

Medium roughing operations have been converted to Carbides almost universally, in the production of war goods, due to recent developments in machine tools and development of stronger, less brittle Carbides.

As an indication of the trend to Carbide cutting tools in this classification during the past three or four years, I do not know of a single shell contract for 57 mm thru 155 mm on which the roughing has been done with anything except Carbides. Small and medium size gun barrels, aircraft engine cylinder barrels, landing gear and other hydraulic aircraft equipment, and similar roughing operations have been done almost exclusively with Carbides.

The third class, or heavy roughing, probably represents the largest potential field for Carbides in the near future, with the exception of milling. This type of work has been the slowest to convert to Carbide tooling for several reasons.

Machines for such heavy work are very expensive, and there is naturally a reluctance to obsolete them and replace with machines of greater rigidity and power. Existing machines are for the most

*Chief Tool Engineer, Kennametal Inc., 135 Lloyd Ave., Latrobe, Pa.

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Capacity to 20 tons



TYPE A - STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

No.	Range of Bores Taken	Net Price
1.4	1/2" to 1"	\$12.00
2A	1" to 11/2"	16.00
3A	11/2" to 2"	23.00
4A	2" to 3"	34.00
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NICHOLSON E-X-P-A-N-D-I-N-G MANDRELS

Equip your shop with these time-saving tools and save both man and machine hours, Nicholson expanding mandrels are made in sizes to take up to 7" bores. It would require 193 solid arbors to fit all the fractional bores between 1" and 7". Think of the time a set of these mandrels saves.

W. H. NICHOLSON & CO. 117 Oregon St., Wilkes-Barre, Pa.



TYPE B — STRAIGHT JAW DESIGN
Adapted for work with both short and long bores.

No.	Range of Bores Taken	Net Price
1×	1/2" to 9/16"	\$10.00
2x	9/16" to 21/32"	11.00
3×	21/32" to 3/4"	12.00
00	3/4" to 7/8"	14.00
0	%" to 1"	16.00
1	1" to 11/4"	18.00
2	11/4" to 1-9/16"	21.00
3	1-9/16" to 2"	29.00
4	2" to 21/2"	40.00

(Other Sizes Taking Up to 7" Bores) Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin No. 1043. part built with very low speeds, high feeds and comparatively low hp. It has only been in the past two to four years that Carbides of sufficient strength to operate with feeds of over .040" per revolution, have been available.

Thus, most of the very heavy roughing operations converted to Carbide have, of necessity, been done on machines which were anything but ideal for Carbide application. Most of the large gun barrel turning, large shells of 8" and over, tank and other armor plate work, torpedo flasks, large shafting for both fighting ships and cargo ships, and similar operations have only been considered as possible Carbide applications during the past months since our entry into the war.

Two general tool shapes have been found suitable for very heavy roughing. Tools with comparatively high side rakes (10° to 15° positive side rake) permit about 30% more removal per hp where power is the deciding factor. High strength Carbide alloys used in such tools, in conjunction with a narrow flat approximately equal to the feed per revolution in width, and ground along the top of the cutting edge at zero or slightly negative rakes, have proven very satisfactory for slow speed operations at heavy feeds. The zero or slightly negative rake on the narrow flat permits the tool to present a blunt and comparatively strong edge to the interruptions or start of a cut, and once the continuous portion of the cut is reached the chip will bridge this flat and flow across the high positive side rake surface.

This high side rake with feeds of .050" to .150" per revolution at the highest speed possible on the machine, is much easier on the machine tool than the conventional operation at much higher feeds and lower speeds with other types of cutting tools. The hp expended in such a cut is, of course, force times distance. and by increasing the distance as much as possible, the hp can be used up with a lesser force. In one shop where 16" shells are being machined with as much as 11/4" depth of cut, 21 aprons were broken on nine machines during a two year period. due to the excessive pressure of cutting with .125" feed at about 30 surface feet per minute. By applying Carbides at the

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State Frame Model and Frame Size. Stipulate whether gage is to be set and sealed. Give complete marking instructions if set and sealed. For specifications see Sheffield Handbook No. 42-2, pages 150-153.



SHEFFIELD SNAP GAGE STAND



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top speed of 128 surface feet and a reduced feed of .046" per revolution, the load on the machine aprons was so lightened that no further breakage of aprons has been experienced. On this operation, the cutting time was reduced from one hour 45 minutes on the old setup, to 45 minutes with Carbide.

More removal per tool grind is possible by applying Carbides to such a very heavy operation, as exemplified by a recent job on a gun liner 17" outside diameter by 40 feet long. The depth of cut was 34" and with a maximum speed of 100 feet per minute available on the machine and .078" feed, it was possible to machine 8 feet of liner between grinds with Carbide tools (900 lbs. removal per grind) as compared with a former practice of about 2 feet of machining per grind of the high speed steel tool bit, at a somewhat lower rate of removal.

On more machinable steels, it has been possible on occasion to operate Carbides at even lower surface speeds and greater feeds. On an annealed nickel chrome steel tube of large diameter in one plant, the top speed available on the machine was only 50 to 60 feet per minute, and a feed of 3/16" per revolution with ¼" depth of cut was taken successfully.

Where power is adequate and speeds and feeds of more suitable nature are available, higher speeds can be used in conjunction with lighter feeds, further lightening the load on the machine. Such work is generally done with flat top tools or slightly negative rakes because of the sturdier cutting edges and consequent reduced tool breakage. Removal per hp is not so high as with positive side rakes, however.

There has been much controversy on whether positive side rake or negative side rake is the best design for heavy roughing work. In most cases it will be found that the shops favoring negative angles are running at relatively higher speeds, those favoring positive rake angles are running at lower speeds and higher feeds. In a sense, both conclusions are logical, as the positive rake angle design is more efficient at lower speeds and decreases in efficiency as the speed is increased. Negative rake angle designs on the other hand, are rather inefficient at

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Your judgment will be doubly vindicated when you invest in "Airgrip" Chucks — (1) Immediately, because your output records will rise — 25% and more—and your manpower problem will be eased; (2) Later On, because the unit-cost-cutting

achieved with these improved, lathe-modernizing chucks will enable you to meet returning competition.

"Airgrip" Chucks offer "two-fisted" double gripping power because of the cam's wedge action (which operates in both directions) and locks the jaws mechanically, whether gripping internally or externally.

Work is held tight even if air supply is cut off completely.

Both the two-jaw and three-jaw "Airgrip" Universal Chucks permit using heavier cuts and coarser feeds to the very limit of the machine's power and cutting-tool endurance.

"AIRGRIP" Revolving AIR CYLINDERS

Double-acting ball-bearing, high-speed revolving air cylinder with maximum life and minimum maintenance. No manual adjustments required. Wear automatically taken up by air pressure within the cylinder.

HI-PO Supercharged HYDRAULIC PRESSURE PUMPS

3000 lb.-Pressure Pump, driven by a ½ h.p. motor! Double-Pressure Production; consists of a low-pressure section which supercharges a high-pressure section. Builds up pressure fast, with minimum pulsation.

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LYON-Raymond Hydraulic Elevating Table



FOR

Handling dies. Elevating or revolving work to best positions. Transferring he av parts from one to another level. Supporting overhanging work.

Bringing work to convenient height for operator.

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Other operations where table-revolving and easy foot-actuated elevation are advantageous.

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at Slight Extra Cost

Two-Speed Hydraulic Pump (in place of single-speed pump).

Indexing Device. Floor Lock.
Retaining Bars. Towing Handle.
Four Swivel Casters (in place of two swivel and two stationary casters).

STOCK DELIVERY

Usually carried in stock for immediate delivery, with or without optional features.

LYON - Raymond

Standard Products

Specialized Engineering

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LYON-Raymond Corporation 334 Madison St., Greene, N. Y.

low speeds and become more efficient as the speed is increased. Thus, there is a critical speed, below which positive angles are more efficient and above which negative angles are more efficient, and the machine is usually the deciding factor, after all.

Note: The preceding material was presented at the recent Chicago Production Conference. During discussion from the floor, it was brought out that a discrepancy in statements about efficiency of positive and negative angle tool designs existed in the foregoing. It was brought out by the discussion leaders that while recent figures showed hp per unit of removal was always higher with negative angles than with positive, the overall efficiency of operation, considering life of the machine, was better at lower speeds with positive angles and at higher speeds with negative angles.

CINCINNATI BORING MILLS

Publication of an attractive 24-page booklet on their Hypro Vertical Boring and Turning Mills has been announced by The Cincinnati Planer Co., Cincinnati, 9, Ohio. This Bulletin No. 131, contains illustrations and descriptions of their different types of mills, coolant pumps, gear drives, speed boxes and taper attachments. Several pages are devoted to discussions of safety features, electrical equipment and table of machine capacities. There are numerous illustrations of important design features.

LOCK RING BULLETIN

Reliance Snap, Bearing, Lock, and Retainer Ring Engineering Folder No. 43 is announced by E. J. Helline, Ass't to General Sales Mngr., Eaton Mfg., Co., Reliance Division, Massillon, Ohio. This folder covers engineering data on rings for SAE Standard bearings, housing and shaft applications, containing compact general information and ready reference on dimensions, end cuts, steel sections, etc., for engineering, designing and purchasing of Reliance Snap, Bearing, Lock, and Retainer Rings. A copy awaits your request.

HISEY-WOLF CATALOG

A handy, convenient size, 36-page catalog, recently issued by The Hisey-Wolf Machine Co., Cincinnati, Ohio contains numerous illustrations of their electric grinders and buffers. Illuminating discussions of the desirable points and qualities of their equipment together with specifications and dimensions are also included.

WHAT'S NEW " COLLET CHUCKS?

LARGER SIZES THAN EVER BEFORE!

3/4" 1" 13/4" 23/4" CAPACITY CAPACITY

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You can now get collet chucks of larger capacity than have ever before been made—four standard sizes ranging up to 2¾" round—also special sizes of larger dimensions, as desired. Readily adaptable to machines of all sizes and makes—lathes, screw machines and grinders—and for ANY OPERATION requiring a chuck.

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Collet of special design, actuated by hardened steel balls, produces powerful gripping action. No stock slippage! Hand lever engages or releases collet without stopping the work head. Precision built. All working parts hardened and ground, insuring long life.

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A Combination of an Air Filter Unit and a Dust Collector Unit in One.

Designed for the removal of the air from fine dust, arising from the operation of grinding, buffing and polishing wheels, sand belts, scratch or abrasive cutting wheels, or any other dust producing machines.

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for every clutch requirement, regardless of load or drive speed.





Fewer Cutter Teeth Improves High Speed Steel Milling

By FRED W. LUCHT*

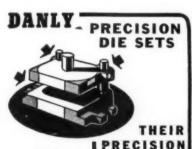
N milling steel with cemented carbides, one of the most important considerations is selection of the correct number of teeth on the cutter. Since increased cutting speed means more cubic inches of metal removed per minute and therefore greater consumption, it frequently becomes necessary-due to power limitations-to reduce the load in some manner. It usually proves to be better practice in such cases to reduce the number of cutter teeth rather than the feed or the cutting speed. Maintaining sufficient feed per tooth is important in steel cutting-particularly in roughing - to provide sufficient tooth loading and adequate load distribution back of the cutting edge.

This is well illustrated by two recent and somewhat typical milling operations on steel parts. The first job concerned the milling of master connecting rod steel forgings by 6" diameter inserted blade face mills having 14 cemented carbide tipped blades. The second case had to do with 4" diameter multi-tooth face milling cutters with 10 to 12 teeth in them, which were being used for milling SAE—1095 parts. In both instances, cutter trouble developed which was satisfactorily solved by reducing the number of teeth in the milling cutters.

In the first instance, the 6" diameter cutters used were standard type face mills operated at a peripheral speed of about 400 feet per minute and with a feed of .0015" per tooth. After milling about 10 connecting rods, the cutting edges were chipped badly. Several of the cemented carbide tips were in such a condition as to make it desirable to install new blades. This meant that after the damaged blades were replaced, the blades had to be re-set in the proper relation to each other and extra time had to be spent in grinding to put the cutter in good working order again.

An examination of the less damaged cutter teeth showed that the light feed per tooth being used had increased the width of the "wear land" behind the cutting edges sufficiently so that the increased pressure, due to dulling of the cutting edges, was beginning to cause portions of the cutting edges to chip out.

In an attempt to increase production per grind and to cut down the time spent in repairing the damaged cutters, every other tooth was removed from each cutter. The remaining seven teeth were then resharpened exactly as they had been



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AIR ENGINEERING EQUIPMENT

previously, an operation requiring a relatively shorter time than before. The same speed in feet per minute and the same table travel in inches per minute were used in these trials as had been previously employed. This, however—due to the number of teeth which had been removed—resulted in a feed of .003" per tooth rather than the original feed of .0015" per tooth.

The increase in feed per tooth enabled the cutters to machine some 30 connecting rods per grind instead of the previous total of 10. On inspection, the cutters showed merely a normal dulling of the teeth. No chipping of the cutting edges and no broken teeth were in evidence. The teeth required only a slight "touchup" with a diamond impregnated grinding wheel to put them into first class condition again.

Furthermore, with this change, only three face mills per machine were needed to keep the operation going, one cutter being on the milling machine; one at the milling machine ready to be used; and the third in the grinding room being re-sharpened.

In the second case, 4" diameter multitooth face milling cutters with 10 to 12 teeth cutters similar to high speed steel cutters were used, except that the carbide mills had negative axial and radial rake angles.

The cutters were being run at peripheral speeds of from 200 to 300 feet per minute. These same speeds were also being used for turning similar material—SAE-1095 stock. The table travel was slightly below the maximum which the knee-type milling machines could handle without stalling.

The cutters had to be removed from the milling machines after about every two hours of service, due to the teeth becoming badly chipped. This resulted in the down-time of the machine becoming a sizeable problem. Moreover, a large backlog of dulled cutters would accumulate around the cutter grinding machine and as a direct result, the milling machine was frequently forced to wait for sharpened cemented carbide tipped cutters or else revert to the use of high speed steel cutters.

In order to determine the optimum operating conditions for this particular

Quick way to STOP DUST!



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dust hoods, "ready to go," fits any double-end pedestal grinder not already equipped with wheel guards and dust outlets.

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DUSTKOPS are compact and portable. Entirely self con-tained, with motor, fan, cy-clone separator (in all but smallest models) and spun glass filter. Flexible metal hose permits quick installation.

DUSTKOPS clean the dustladen air without wasting heat. Efficient cyclone separator pro-vides low maintenance. Many other features make DUST-KOPS ideal for your shop or laboratory. Immedia Immediate shipvoltage tomitm.



MODEL 950-with cyclone separator means low first cost, low maintenance, even on produc-



(Left)

MODEL 1250one unit handles dust from four wheels.





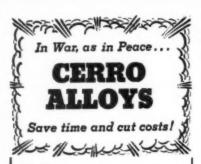
MODEL 1250-gets all dust and smoke from this heavy duty abra-sive cut-off, at extremely low cost.



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job, a fly cutter was made up by mounting a 5%" square cemented carbide tipped single point tool in a cutter body. This cutter design was established and maintained thruout all of the succeeding runs:

	Cutting Diameter	3"
	Axial Rake (negative)	5°
	Radial Rake (positive)	8°
	APLANT THIS COLUMN COLU	30°
•	Radius On Corner1/	
	Relief Angle (all around)	70

Eight single point tools—tipped with a general purpose steel cutting grade of cemented carbide—were ground to these specifications on a cemented carbide single point tool grinder. The fly cutter was used to mill a cut 1/16" to 7/16" deep.

The first series of runs with these eight identical tools was made on the basis of maintaining a constant feed as close to .0035" as possible, but with varying speeds. Operating speeds of 333, 414, 515, 636, 780, 970, 1200, and 1500 rpm were selected, equivalent to cutting speeds ranging from 261 to 1178 feet per minute.

Each one of the eight tools was run at one of the eight speeds. Two hundred pieces were machined with each tool and then the tool bit was removed from the fly tool holder. Each tool, together with sample chips, was placed in an envelope for later study. After all eight tools had been run in this manner, their cutting edge condition was compared and the width of the wear lands on each tool was measured.

From these tests it was learned that the cutting edges remained in the best condition at the speed of 780 rpm, which in this case is 613 feet per minute. It was also learned that at lower speeds, the wear lands were inclined to be wider and there also appeared to be some tendency for the cutting edges to chip. At speeds higher than 613 feet per minute, the growth of the wear lands showed a tendency to increase with the speed, but the chipping seemed to have been eliminated.

For the next step in this investigation, the eight single point tools were re-sharpened according to the specifications already given. Particular attention was given to grinding to assure duplication of



While selecting the grade or hardness of a superfinish stone for a given finishing operation the wisest course is to consult a representative of the stone manufacturer. MID-WEST, for instance, maintains a staff of experts to help you with your honing, superfinishing or grinding problems. When, as sometimes happens, that is not possible, here's a simple way to determine whether the stone you are using is of the proper hardness:

Study These Photographs



If the stone becomes too black (caused by oxydation of metal on the stone) the stone is too hard.



If the stone remains too clean, too close to its original color, it is too soft.



The stone best suited for your job will be a compromise between the two. It will show only a slight discoloration of its cutting surface.

MID-WEST ABRASIVE COMPANY

Manufacturers of DEPENDABLE Abrasives 1960 E. Milwaukee Avenue, Detroit 11, Mich.

Mich.

details. In the series of runs made with the eight re-sharpened tools, a constant speed of 613 feet per minute was maintained in all instances, but eight different table travels were selected to give feeds per tooth ranging from .002" to .010". All other operating conditions of the first series of tests were duplicated.

It was learned that feeds of from .006 to .007" per tooth gave the minimum width of wear lands. For lighter feeds per tooth, the width of the wear land gradually increased as the feed per tooth decreased. The wear land also was greater when feeds per tooth heavier than .007" per tooth were used. In these instances, the cutting edges showed signs of chipping, apparently due to the lack of rigidity in the milling setup. This might have been helped by the addition of a fly wheel to the spindle nose.

The optimum speed of 780 rpm (613 feet per minute) and the optimum feed of .006 to .007" per tooth coincides quite closely with those which we at Carboloy have found to produce the best operating conditions when machining such materials. An item worthy of note, brought out

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WHITNEY METAL TOOL COMPANY

by these two investigations also is that rigidity of the milling setup is of utmost importance. The gib in the milling machine table should be snug; the fixture must be rigid; the work must be clamped firmly; the cut should be taken as closely as possible to the table and the spindle of the milling machine; and the spindle end play must be kept at a minimum.

It was also noted that at the higher speeds and feeds, the cutters operated much better when cutting dry than they did when cutting wet.

In performing these experiments, it was noted that the lighter and medium sized milling machines could be stalled fairly easily with a fly cutter. This observation illustrates the importance of providing milling machines with large size motors capable of pulling the multi-toothed cutters since this will permit the use of increased table travels.

In the second case described, the fly cutter also helped to eliminate a bottle neck in cutter grinding. When the single point tool used in such a cutter becomes dull, it can be quickly replaced right on the job with a sharp one without having to remove the fly tool holder. The single point tools can be re-sharpened quickly by free hand grinding on a simple single point carbide tool grinder.

SOMERSET RADIUS DRESSER

In a 4-page folder, the Somerset Tool Co., 224 Virginia St., Hillside, N. J. offer their radius dresser for surface grinders. It discusses outstanding features of this equipment and is illustrated with views of the dresser in actual operations. Some helpful suggestions are given on short cuts in die production.

NEW TOOL GRINDER

Grinds Milling Wheels, Slitting saws, Lathe Tools, Wood Turning Chisels, Many Small Tools to any Degree or Angle.

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TRADE MAKE

Steenley See'esty Seews are equipped with an approved safety guard which covers cutting edge, swinging back as saw blade advances into work. Safety switch and balanced handle are additional safesquards.

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Added strength has been given this clamp (Model 505) by forging, which also permitted the redesigning to effect a reduction of 17% in weight.

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WHAT'S NEW IN METALWORKING

BAILEY CONTOUR CONTROL

NEW Contour Control, employing the principle of the precision air measuring gage to obtain extreme accuracy in automatic operation of machine tools, has been developed by Bailey Meter Co., 1059 Ivanhoe Road, Cleveland, Ohio, It employs a pneumatic system which scans a thin metal templet and controls powerful hydraulic cylinders which accurately position cutting tool or work with relation to the

This control has demonstrated its ability to turn, bore and face automatically to the exact contours of templet used to guide its operation. Accuracy of repetition is said to be within .0002" and surface smoothness is limited only by factors other than the control. The makers say that when both tool and templet have been properly ground and honed, the control has

operated an engine lathe to produce a surface smoothness of 60 micro (millionths) inches as measured by Brush surface analyzer.

Contours may include slow and fast tapers, round corners and square shoulders. All diameters and shoulders of a step shaft may be turned with one tool setting. Difficult contours which formerly re-



quired use of special forming tools may be turned with one setting of a simple tool.

Accuracy of the Control is obtained by using the air control system as an amplifier of motion and a source of power in transmitting movement of tracer stylus to the hydraulic control system.

Motion of hydraulic pilot is from 25 to



tenance of war material . . . proof of worldwide SHELDON accuracy and dependability.

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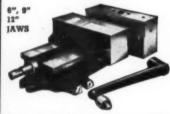
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Sold with Attachments, or Plain (drilled for attachments)

The three sizes of this unique vise range from light drill press work, to a heavy 122-lb. size for heavy planer and shaper cuts. Optional attachments include stops, guides, V-jaws, etc., which convert the Vise into a many-purpose jig or fixture for special-holding jobs. In this connection, note the flush, parallel and four-square construction, aiding accurate positivning of work either flat, against angle knees, or even with vise on side or end. "More than a vise!"

Request Illustrated Price Circular

GRAHAM MFG. CO.

52 Bridge St. East Greenwich, R. I.

100 times greater than that of the stylus, depending upon rate of spring used in the hydraulic pilot valve assembly. A fully balanced air pilot valve permits operation of tracer stylus with from 3 to 8 ounces of force. This permits use of a soft metal templet.

Tracer design, which is based on regulation of an air flow to create a back pressure, permits of minute measurements in a few thousandths of a second. It employs the same principle used by precision air measuring gages, except that it regulates air flow by stylus position instead of by size of piece being measured. In both cases, rate of air flow indicates measurement.

The Control was originally developed for use in the Company's own machine shop where it is necessary to make flow meter parts which exactly match contour of specially calibrated master parts. It is explained that this operation, which formerly required the best efforts of skilled machinists, is now being performed automatically by the Control.

While the possibilities of applying the Control to various machine tools are bounded only by the imagination, its use at present is being limited to lathes and vertical boring mills. The illustration shows application to a 12" Hendey Lathe. A sturdy templet support rack is shown rigidly fastened to lathe bed. A pneumatic tracer is held by a rigid arm securely attached to lathe cross-slide; cross and longitudinal power cylinders are both attached to lathe carriage; hand controls are within easy reach of operator's right hand; a control power unit rides back and forth on a monorail track with movement of lathe carriage, and air filters and pressure reducing valves are included which supply compressed air to pneumatic tracer. Monorail track is supported by brackets attached to lathe pedestals so control makes no floor obstruction.

Control power unit consists of a large oil reservoir, a motor driven oil pump, hydraulic pilot valves for feed and contouring action, and directional flow selector valves which provide for setting up machine to turn, bore or face. Bulletin CC-1 gives full details.

REDMER AIR CHUCK

In a 4-page, illustrated bulletin, the Redmer Chuck Co., 601 W. Washington Blvd., Chicago 6, Ill., announce their new model No. 2 Special, in various collet sizes. A number of typical operations are shown and tables of sizes and specifications are also included.



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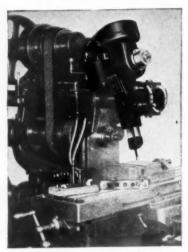
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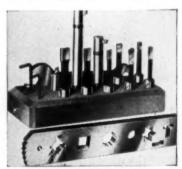
Representatives in Principal Cities In Canada: Railway & Power Engineering Corp., Ltd.



TURRET MILLING MACHINE



A new Bridgeport vertical shaping attachment has been developed recently by Bridgeport Machines, Inc., Bridgeport, Conn. It permits shaping, milling, drilling and boring operations. The attachment can be mounted on existing Bridgeport turret millers, as well as other types of milling and production machines.



Overarms on all Bridgeport millers are machined to take the attachment, and special adapters are available for other makes of machines. NO"RE-CONVERSION" PROBLEM

STANDARD Carboloy Tools

WHEN you use STANDARD Carboloy Tools you obtain top performance—maximum economy—on your war applications nose, and at the same time remain in a position to quickly convert your stock of tools to peace-time use. With "standards" as basic stocks, you grind to special shapes to fill current needs only, and keep reserve stocks in the form of standard styles for quick, future conversion.

STANDARD Carboloy Tools, adaptable to 60%-80% of all single-point turning, boring and facing applications in the average plant—are available in 10 styles, all commonly used sizes, and a range of grades for maximum results on cutting steel, cast iron, non-ferrous metals and non-metallics. Write for catalog GT-175.

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The attachment can be set at any required angle so that large dies can be revolved without the use of a rotary table. The unit has a square Meehanite ram with gib adjustment for wear takeup. Six speeds provide working strokes per minute of 70-100-145-205-295-420. Stroke is adjustable from 0 to 4" by merely turning graduated dial. A set of shaping tools consisting of seven formed tools and three holders is available for this attachment.

Illustrations show the shaper attachment installed, also the assortment of tools and some samples of work perform-ed with this attachment. Shaping opera-tions can be performed at all angles, making the attachment fast and practical on die and mill work of all kinds, as well as for intricate slotting and production jobs.

EMPIRE TOOL HOLDER

A new floating tool holder is announced by Empire Tool Company, 8782 Grinnell Ave., Detroit 13, Mich., to be manufactured under acquired patent rights.

More perfect correction of misalignment both off-center and out-of-parallel is claimed for this tool. Being made of only five component parts-the moving parts riding on rollers so placed as to affect

a self adjustment of the float in any direction-the holder is said to ream holes with close tolerances to absolute size and perfect roundness. The rollers also contribute to making the members antifriction and to producing smoother running. It is claimed that the possibility of making bell-mouthed holes is eliminated. Use of the tool reduces maintenance to a minimum. There no parts to fall out or get lost when holder is taken apart.



Two sizes of bodies are available. The 2½" body can be obtained with ½", ¾", or 1" holes in choice of 1, 1¼, or 1½" diameter shanks. The 3" body is made in 1. 11/4. and 11/2" holes with choice of 11/4. 11/2, 13/4, 2, 21/4" diameter shanks,



WHEN PRECISION WORK CALLS FOR TINY HOLES .004 to 5/16" diameter

The HAMILTON MUEHLMATT Super Sensitive DRILLING MACHINE

Instrument boards, aircraft, Diesel, and other innumerable jobs often call for tiny hole drilling. Use this H-M and save on small drills still so hard to get.

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Ninth and Hanover Streets, HAMILTON



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When you invest in new burs — should you accept the hand-ground product or insist on machine-ground burs? You be the judge — here are the points which determine bur value:

is the cutting edge. It extends around the bur body on a helical angle. To be accurate, it must be machine

ground.

②is the rake. For some metals you need radial rake, for others a negative rake. Machine grinding assures rake accuracy — all the way.

(a) is for concentricity. Only a machine-ground bur can give you truly concentric running. The human element — all-important in hand grinding — is eliminated.

(a) is the flute spacing. Only in machine-ground burs do you get truly accurate spacing and the same number of flutes in every bur of identical type.

(3) is the depth determined by the angle, 6. You need specified and uniform depth for chip clearance. Only in machine-ground burs can you be sure of getting it.

FINALLY—the machine-ground bur is WET-ground, giving better finish and no burning of the cutting edges. Hand-grinding is done dry.

Pratt & Whitney burs are machine-ground on our special bur grinding machines designed by P&W engineers. The human element is removed — you receive all the fine points in every Pratt & Whitney bur. Try them on your next order.

This is an actual cross section of a Pratt & Whitney Kellerslex Bur, sawed through and enlarged to eight times size.

PRATT & WHITNEY
Division NILES-BEMENT-POND COMPANY
KELLERFLEX SALES DIVISION
WEST HARTFORD, CONN.



WIEDEMANN TURRET PUNCH PRESSES

Short run piercing can be done quickly, accurately and at low cost with turret punch press equipment developed by the Wiedemann Ma-chine Co., 1815-31 Sedgley Ave., Philadelphia, 32, Pa. With vertical turret principle, an operator changes from one die to another in from 5 to 10 seconds, as compared with 15 to 20 minutes or more on conventional equipment.

In addition, the gage tables facilitate layout work on a job. The whole action takes little more time than required for a man to set two dials and trip the press. Costs are held down, production is raised to a high level, according to the mak-

Since these turret punch presses range from hand-operated bench types to power presses of 80 tons capacity, having 60" turret depth, practically all sizes of sheet and plate materials can be handled efficiently.

Minimum thickness of material for the larger presses is 1/2" mild steel.

The turrets are so mounted that they swing into place easily for



all stations. Upper and lower turrets are synchronized to operate in unison. They are locked into position by means of index pins which engage index holes. The presses can be provided with horizontal upper and lower turrets for piercing of flat materials, and with vertical lower turret for shapes and curves as well as flat pieces. In many cases, punch and die units can be removed from turret and replaced with other sizes without resetting the die-holder.

Of special importance is the comparatively short stroke (% to 1") which reduces speed of the punch and eliminates impact of material and attendant distortion.

Gage tables are accurate and some models will hold punching operations to a tolerance of plus or minus .002". The locating dimension is obtained either by means of direct reading scales or gradu-ated dials. Types are available for piercing thru templates.

One of the illustrations shows unit with 24 stations. Punches and dies have not yet been mounted. Punches and dies up to 5" diameter are carried. Press has 30" depth of throat and a capacity of 40 tons pressure.

The other illustration shows upper turret in horizontal position and a vertical lower turret. This arrangement is specially

New Britain UNIVERSAL VISE

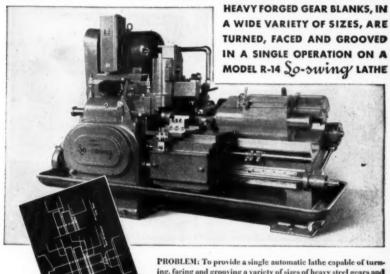
THE ORIGINAL



NEW BRITAIN TOOL & MFG. CO. **NEW BRITAIN, CONN., U. S. A.**

MACHINE OF THE MONT

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENECA FALLS, NEW YORK



Have You Received Your Copy?



Bulletin D-43 describes 18 standardized models of this time and laborsaving Work Driver. Write for your copy today. Seneca Falls Machine Co., Seneca Falls, N. Y.

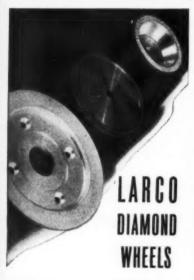
ing, facing and grooving a variety of sizes of heavy steel gears and requiring minimum change-over time from job to job.

SOLUTION: The R-14 Lo-swing Lathe was chosen for this job primarily because it had the power and capacity necessary tohandle heavy steel gears, varying in size from 41/4" to approx. imately 10" diameter. The built-in, Quick Change-over Mechanism on this lathe also provided a simple and speedy means for varying the carriage stroke, as required for each individual gear job. Forged gear blanks come to the lathe with only the hole finished.

Drive is by arbor through this hole as seen in the drawing above which illustrates typical tooling for one of the gears.

In order to simplify tooling, this Model R-14 Lo-swing was equipped with a standard Third Slide or Overarm which carries the grooving tools. Turning is accomplished with the Front Carriage tools while tools on the Back Attachment face the sides of the gears.

EWS from SENECA FA



- Four generations of concentrated experience in diamond cutting
- A staff of experts to advise on diamond tools and their uses
- * A tradition of Craftsmanship

LARCO DIAMOND TOOLS

CHISELS WHEELS DRESSERS POWDERS



LARCO TOOLS, 551 Fifth Avenue, New York 17, N. Y. Please send, without charge, your Book on Diamond Wheels.

FIRM NAME

Address



adapted for curved and shaped sections, exemplified in the aircraft industry. The turrets carry 16 to 18 punches and dies up to 2" diameter. The press has a capacity of 12 tons pressure, with 18, 24 or 28" turret depth. Bulletins 92 and 101 give complete information.

ABC DRILL JIG BUSHINGS

Accurate Bushing Co., Garwood, N. J. has issued an especially handsome 8-page loose leaf plastic bound Catalog on their headless press fit bushings, renewable bushings and headless liners. Some space is devoted to suggestions to purchasers, including information on how to order, prices, drill sizes, shipments, and data on accuracy and concentricity. Table of fractional, letter and number drill sizes and decimal equivalents is also given.

CHICAGO RIVET SERVICE

In an attractive, new 24-page booklet, the Chicago Rivet & Machine Co., 9600 W. Jackson Blvd., Bellwood, Ill., offer their war-tested riveting engineering service. Members of the trade are invited to submit problems and service is offered, without obligation. Recommendations may involve either single or multiple setting, depending upon the characteristics of the assembly. The booklet contains descriptions and illustrations of various types of machines and equipment offered with illustrations of typical jobs.

Super Spacer ...

THE ULTIMATE IN CONTROL OF MACHINING OPERATIONS

with its attachments and fixtures...

a tool of exceptional value for the rigid control of accurate machining operations. It is quickly adaptable for milling, drilling, grinding, jig boring, and slotting at feeds and speeds limited only by the capacity of the holding means and the power of the machine.



Descriptive circular sent on request

THE HARTFORD Special Machinery Co.

A COMPLETE HEAT TREATING UNIT

Designed to do a complete heat treating job, a new combination unit has a high temperature hardening furnace on left, quench tanks in center and a recirculating draw furnace on the right. Built by Waltz Furnace Co., 2450 Gilbert Ave., Cincinnati 6, Ohio, and known as model CH, this unit is made in three sizes, viz., 8" wide x 6" high x 12" deep, also in 10 x 8 x 15" and 12 x 10 x 18" sizes.

Temperature in hardening furnace is automatically controlled by an indicating pyrometer that can be hand-set to hold any temperature in the range of 1350 to 2300° F. Within muffle or heating chamber, a protective atmosphere (to prevent scaling and soft skin) can be introduced controlled by two values.

introduced, controlled by two valves located beneath the gages shown. These gages make it possible to duplicate the atmosphere, once the type needed has been established. Walls are 7" thick, of fire brick and block insulation.

There are two quench tanks in center of unit, a small one for oil and a large



one for water, the water entirely surrounding the oil tank thru double walls. There are perforated baskets in both tanks.

Recirculating draw furnace has a range of 250 to 1100°, controlled by an automatic, indicating pyrometer similar to that on hardening furnace. Interior of

The New KEENE INTERNAL GAGE

INDICATES AMOUNT OF STOCK TO BE REMOVED



AGENTS WANTED

Keene Internal Gage is for accurate checking of holes, machine bored or close ground. Easy to use, Sayes time and material, Ideal for the tool room.

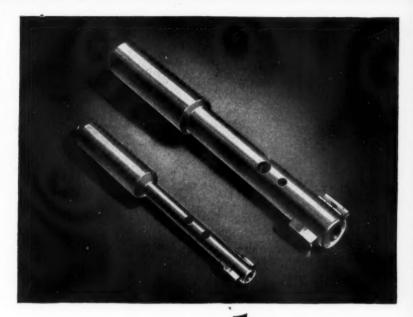
Capacity 1/4" to 6"

Manufactured by

KEENE ELECTRICAL MACHINERY CO.

542 West Washington Blvd.

Chicago 6, Illinois



FINISH REAMING IN

Hold tolerances as low as .0002 of an inch and yet produce a finish that in most cases makes additional finishing operations unnecessary. Madison Reaming Tools answer modern industry's demand for faster, better techniques for all reaming operations. With Madison Reaming Tools the cutter may be floated right in the Madison Bar. This alone saves the cost of high-priced floating tool holders and chucks as well as many vital minutes of set-up time.

Because Madison cutters are pre-sized they may be slipped from, or reinserted in the Madison bar without disturbing the original set-up. Each Madison bar interchangeably holds a range of cutters to ream all diameters within that range. For example: The 2" Madison bar accommodates cutters covering all diameters from $2\frac{9}{16}$ " through $3\frac{1}{2}$ ". Changing the cutter takes but a fraction of a minute.

Another feature exclusive with Madison tools is the unique one-screw adjustment principle. Tool room work is held to a minimum and the possibility of an off-center adjustment is eliminated. One screw expands the cutter to make up for wear and regrinding or allows the cutter to be set to any desired

dimension. Time and costs saved with Madisons will allow you to make a lower estimate on your present and future contracts.



To better solve your reaming problems, write for the new Madison catalog . . . shows com-plete lines, prices and grinding instructions.

MADI

MANUFACTURING COMPANY WULF & SPRING STS., MUSKEGON, MICH.

INDUSTRIAL DIAMOND TOOLS FOR EVERY USE



Our No. 703—three layers of seven diamonds each. Multiplicity of cuting points; depending on diameter of wheel, four or more diamonds will always contact the wheel, giving finer dressing and precision finish. Recommended in all straight-faced dressing and truing on wide-faced, hard silicon carbide wheels. Used most effectively on Cincinnati Centerless, Norton Cylindrical, Landis Cylindrical, and Cincinnati Cylindrical Grinders.

Requires fewer passes across the wheel.

Generally used with fast dressing traverse.

"Experts agree they are the best on the market."



31 W. 47th St., New York 19, N. Y. Branches: London; Bahia, Brazil draw furnace is of alloy steel, around which is cast insulating lining, in turn protected by outer shell of steel. Inside furnace, the hot air for tempering, heated by a unit in base and recirculated by a high velocity alloy steel fan also located in base.

Outside shell is of formed steel all-welded construction. Treadles in front open the furnace doors. All equipment necessary for operation is located inside base and easily accessible. Entire unit is compact and complete, occupying only 33x98" of floor space for the small size, and requiring but a gas connection and an electric power outlet.

MERCURY COUNTERSINKING MACHINE



Mercury Products Co., 423 Euclid Ave., Cleveland (14) Ohio offer an interesting new countersinking machine.

It has only two rotating members, no belts to wear out, a work rest of tungsten alloy heat-treated steel to eliminate wear, and is equipped with high quality motors.

According to the makers, working tests have shown that this machine occupies 1/6th the bench space usually needed, takes 1/5th the usual power consumption (less than 1/6 hp), saves more than 40% in labor costs and increases production more than 100%.

Notable features include a heavy cast iron base; No. 8½ Jacobs super chucks, heavy tool post for strength and rigidity; heavy duty switch, (optional knee control or floor pedal); high intensity work light over work rest; tool post micrometic adjustment for depth and height and end micrometic adjustment for depth of countersinking.

Machine is 28½" long, 10½" wide, and 11" high over top of work light. It weighs 70 pounds (approximately 90 pounds crated for shipping).

Today machine shops must be equipped to grind odd-shaped forms. To do this precisely requires dressing the abrasive wheel to the desired con-tour. No. 41 does that, accurately, quickly.

At Last... It's Possible! Now Even the Operator of Limited ess and Re-dress natroducing Contour. Angle Plus regular radius

and angle Dressing

Virtually any desired contour can be generated on abrasive wheels by placing a template of the curve in the clamp of No. 41-B. A spring-activated plunger follows the contour of the template as the operator simply turns the knob. As he turns it, the chisel pointed diamond of the dresser moves across the face of the rotating abrasive wheel. dressing it exactly to the shape of the template.

Flexibility, accessibility of parts for cleaning, and simplicity are

among the features of No. 41-A Radius and Angle Dresser made possible by expert engineering design.



No. 41-B Template Dresser. Rear View.

After the wheel is dressed by the chiselpointed diamond, it fits the template accurately. When worn, it is quickly redressed to the same contour.

With its base, No. 41-A does all the usual jobs of a quality radius and angle dresser. Yet its cost is remarkably low.

Write for Booklet A



No. 41-A Radius and Angle Dresser. Front View.



BEST TOOLS CORPORATION

ROCKVILLE CENTER, LONG ISLAND,

4 of the 101 uses of the UNIVERSAL INDEXING HEAD

1. Accurately Grinds Irregular Pieces

Square or odd-shaped pieces may easily be held as shown. Simply weld a plate to round shank, insert guide pins and clamp firmly. Read the 3 graduated dials for exact duplication.

2. End Grinds Large Shank Tools

Straight or taper-shank tools which have a shank too large to fit the quill are easily and accurately ground as illustrated at right.

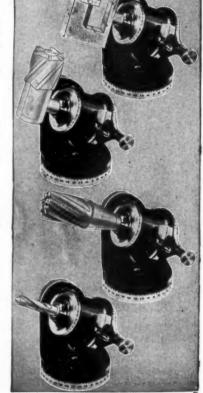
3. Grinds End Mills with Oversize Shanks

Quick and efficient grinding of tools with extra large shanks is a simple operation with the Universal Indexing Head.

4. Sharpens Chatter-Proof Countersinks

Maintain your tools in their original condition. Illustration shows method of sharpening straight or taper shaft chatter-proof countersinks.

Write for illustrated circular that describes the many exclusive features of the Universal Indexing Head.



CLEVELAND TOOL

1249 W. 4TH STREET

ENGINEERING COMPANY CLEVELAND 13, OHIO

* There's a Reason

WHY MARSHALLTOWN PRESSES GIVE YOU

★ BETTER PRODUCTION

LONGER LIFE

Yes, you can rely on the performance of a Marshalltown Press—they give you the most for your money, because they are engineered and built for dependable trouble-free service. Features include — more die space, chrome molybdenum cranks, wrist pin connections and many other proven advantages.

Write today for literature about Marshalltown Presses — available in capacities from 5 to 70 tons.



NO. 5 FLYWHEEL TYPE

MARSHALLTOWN MFG. CO.

900 E. Nevada Street

MARSHALLTOWN, IOWA







Adjustable vise and roomy working table make the Peerless Standard a mighty useful Metal Sawing Machine.

ADJUSTABLE VISE JAWS FOR 45° ANGULAR CUTTING...

ODD-SHAPED pieces are locked in place easily and quickly in the Peerless Standard Metal Cutting Saw. The work can be placed from front or sides.

Coolant flows before cutting starts; cool cutting at all speeds is assured. Straight line pull on blade minimizes blade wear and breakage, eliminates blade twisting. Spring feed eases feed pressure on hard spots and blade lifts on return stroke to clear chips for long blade life.

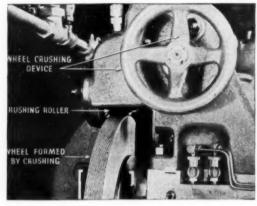
Three sizes: 6x6 in.; 9x9 in.; 13x16 in. One or three speeds. Belt or motor drive. All have automatic feed. Used by the U.S. Navy aboard ship, also in large plants and small shops. Mail the coupon for complete information. Do it now.

PEERLESS MACHINE COMPANY, 1600 Junction Avenue, Racine, Wis.

Builders of Fine Tools for Thirty Years—Acro-Matic Grinders Hydraulic Pumps Blades Coolant Special Machinery.	PEERLESS MACHINE COMPANY, Dept. MT-544, Racine, W Mail catalog on Hydra-Cut Saw for High Production Cutting Mail catalog covering Vertical Type used for Die Block Work Mail catalog on Mechanical Type Saw for production cutting Mail catalog on general utility and maintenance Sawa Company.	
The second second	Individual	
	Street	
COC	City State	

THE SHEFFIELD MULTI-RIBBED THREAD GRINDER

Precision thread grinding has long been a standard practice of the Sheffield Corp., Dayton (1) Ohio. This organization built precision thread grinders for gage produc-tion in World War I. Since then many ma-chines have been made for manufacturing thread gages, lead screws and other threaded parts. The operation quickly became widely adopted and is applied to production of all types of threads. It is used particularly on pre-cision parts for aircraft engines and instruments, for threaded parts of machine tools and for countless other standard components.



Applications of the Sheffield precision thread grinder include:

1-Grinding threads to gage tolerances

by use of the single point diamond dressed wheel. 2-Grinding threads to a class three fit

POSITIONERS

as far as the eye

through the light haze of this gigantle wolding department extend triple rows of G-F Positioners. From this almost endiess production line (the photograph is taken from the half-way point) such day come heretofore unheard of numbers of fabrication with all seams, loists and unions strongly and smoothly welded "dewnhand". There are no handling problems or delays, for on G-F Positioners cash welder positions his weldment for succeding welds with a push-button control—can rotate it at any desired speed (360°) or tilt it to any angle up to 135° beyond herizontal.

Write for Bulletin WP-22

CULLEN-FRIESTEDT CO., 1321 S. Kilbourn Ave., Chicago 23, Illinois

DRIVES for EVERY NEED

Different types of machine tools require radically different drive designs.. and Berkeley can supply drives for practically all types, kinds and sizes of machine tools. That's important because Berkeley drives are engineered specifically for your machine tools.

Berkeley drives enable you to obtain modern production performance because Berkeley is a pioneer drive specialist. Berkeley knows machine tools and thoroughly understands modern drive requirements.

Berkeley drives increase flexibility of operation and speed of production because they deliver the most efficient speeds for the jobs, permitting you to take full advantage of the latest carbide tooling.

> Low in first cost, Berkeley drives are economically maintained. Berkeley drives quickly pay for themselves through production savings which they make possible, and give dependable life-time service.

LET US SEND YOU DETAILED FOLDER

BERKELEY

Without obligation on your part, let Berkeley tell you how to get more work and more profit from your machines and men.

Equipment Company

1022 BAHLS ST. DANVILLE, ILL.



by the plunge grinding method, using a multi-ribbed wheel formed with a high speed steel crusher roll.

3—Grinding irregular forms entirely foreign to threads by using a wheel which has been formed by the crusher method.

Grinding threads to gage tolerances with a single point wheel diamond dressed is the conventional method now in general use by American industry. The Sheffield crusher roll method of dressing wheels employs a hardened steel roller which has been accurately ground with a series of annular grooves of correct thread form or ground to a special form. It is engaged with the slowly rotating grinding wheel and thru what may be termed "pressure milling action", the form of the crusher roll is reproduced on the abrasive wheel.

It is pointed out that with the wheel crushing method of dressing, all of the ribs on the multi-ribbed grinding wheel can be dressed simultaneously in less time than is taken to dress a single point wheel. A single-ribbed wheel, diamond dressed must bear the entire load of grinding whereas only a fractional part of the load is carried by each rib of a multi-ribbed wheel. The multi-ribs retain their form longer and less frequent wheel dressings are required and many

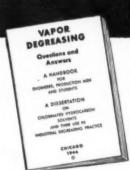


more parts can be produced per dressing. Crushing roller is fed into the wheel to the full depth of cut and an additional 1¼ revolution of grinding wheel completes the forming and sizing operation.

In plunge thread grinding, length of

New Complete Manual on VAPOR DEGREASING

Solves Metal Cleaning Problems



If you are concerned with industrial solvents and degreasing in any way—you will find this new book a source of much valuable practical information. It is the last word on the rapidly growing field of Vaper Degreasing—an unbiased, factual presentation of the subject. Written by a leading metal-cleaning engineer, in clear, concise question and answer form—this illustrated handbook takes up every phase of vapor degreasing including: Types of work that can be handled by vapor degreasing, recovery of solvents, toxicity, degreasing of bowl-shaped parts, proper size of degreasers, special uses for degreasers, and many other problems.

Send for FREE Copy

Send in your name and address today and a copy of the VAPOR DEGREASING Manual will be sent to you entirely FREE—without any ebligation. Also ask for the latest Phillips Catalog of Vapor Degreasing equipment and solvents.

A Complete Line of Vapor Degreasing Equipment Phillips Degreasers and Solvents are today being used in every branch of industry to handle efficiently a wide range of metaleleaning and related jobs. The complete line of Phillips Vapor Degreasers includes electric units of all sizes to handle every type of work. Write today for eatalog and full details!

PHILLIPS Manufacturing Company 3492 W. Touhy Ave., Chicago, III.

You can take heavier cuts at Faster Speeds with MIDWEST KEYWAY CUTTERS...



Here are 3 important

reasons why—

1—SUPPORTED AT BOTH ENDS—the cutter is made with an extended center which provides a support for it at the outer end, thus both ends of the cutter are supported, giving absolute rigidity to the operation.

2—THE POSITIVE DRIVE—Midwest Cutters have a stub taper shank with a groove to fit a pin that is partly embedded in the wall of Midwest patented Taper and Pin Drive Holders. Full driving energy is exerted along the entire length of the shank, giving the cutter absolute rigidity and perfect alignment. No parts easily dislocated or lost are

3-SCREW LOCKED—the cutter shank is designed for positive locking to the holder by a lock-screw which bears against the angular flat on the shank of the cutter. Cutter vibration is eliminated.

MIDWEST TOOL & MFG. CO.



END MALS + SLEEVES + COUNTERBORES + DRILLS + SPECIAL TOOLS REAMERS + FORM TOOLS + CARRIDE TIPPED TOOLS + ADJUSTABLE HOLDERS



Precision METAL CUTTING TOOLS

thread is limited to width of wheel which is brought into full depth with approximately 1/3 of the revolution of the work head. A fully threaded part, for example, is completed in another full revolution, or a total of 1-1/3—revolutions for the entire operation. When plunge grinding forms, the wheel is pushed into full depth in one or more revolutions of the work head, depending upon depth of the form.

It is claimed that compared with single point grinding, production of most parts can be stepped up approximately two to four times. Commercial threads of class three fit are easily obtained. Where length of threaded part exceeds maximum allowable wheel width, it is possible to traverse grind up to a maximum of 8" length of thread.

Different threads with a wide range of pitch are now being successfully ground with the multi-ribbed wheel dressed with the crusher roll. This method is said to be opening up a new field to grinding where production is of the first consideration and where fine finish and close tolerances

are required.

According to Louis Polk, President of Sheffield Corp., possibilities of the crusher roll method for dressing wheels offer many unexplored opportunities, Company engineers continue to pioneer in finding ways to expand its usefulness. Sheffield has its own wide experience in this work plus the valuable knowledge gained thru long association with British concerns producing similar equipment.

WILLEY'S DIAMOND DRESSER

A pioneer in the development of diamond tools and mechanical dressers, Willey's have again entered this field with a line incorporating many improvements.

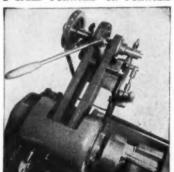
Diamonds set by their method may be used up completely, or reset if desired. This is possible because the special metal in which the diamond is anchored has machinable properties. It is claimed that setting diamonds in metal so greatly prolongs their life that small diamonds will satisfactorily and economically dress a wheel that formerly required large expensive stones.

It is emphasized that their mechanical dressers have many advanced features in design and construction which are explained in Catalog, No. 41. Copies may be obtained by writing Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit 1. Mich.

E. Z. - 2 SPEED COUNTER SHAFT

FOR LOGAN, ATLAS AND OTHER SMALL LATHES. INSTANT SPEED CHANGE.

2 SPEED FORWARD OR FORWARD AND FAST REVERSE FOR TAPPING,



REAMING, ETC. PRICE COMPLETE, \$75.00. INSTALLED IN 30 MINUTES. INCREASES PRODUCTION 80%.

E. Z. DRILL GRINDING ATTACHMENT 3/32" dia, Minimum 1" dia, Maximum

Type 1 — \$5.95 Type 2 — \$7.95

Sharpen drills in one minute to factory accuracy.

Thousands in use by both large and small war production plants.

Send for description.

IMMEDIATE DELIVERY - DEALERS WANTED

E. Z. MANUFACTURING CO. 1709 W. STH. STREET

"SOMETHING NEW HAS BEEN ADDED"

TO THE CUTTING TOOL FIELD

"FREE TOOL"

Announcement in the June issue

GENERAL TOOL & DIE COMPANY

555 PROSPECT STREET

ORANGE 5-2500

CUTS BOLT DRILLING COSTS

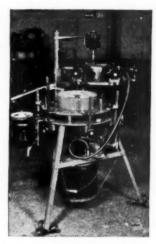
An interesting, new machine has been developed by W. B. Burke & Co., 1609 E. 36th St., Cleveland, 14, Ohio. It is said to have a normal production capacity of 325 drilled bolt heads per hour. Each bolt is drilled with 6 horizontal holes and one central hole. As the operator becomes more experienced, production capacity may be increased.

The bolts are placed in an automatic chuck, heads down, and are held rigidly in that position while all seven drills are operating on the head simultaneously. While the drills are in operation on the head, the operator has ample time to run the vertical drill suspended over the machine thru the holes, thus reaming and burring the drilled holes so that each pair of holes is in alignment.

At the fingertips of the operator, are adjustment screws controlling depth of horizontal and vertical drilling. An adjustment may be made while machine

is in operation.

The vertical drill superimposed over the head of the machine, is called "The Inspector". The reason for this is that should a hole be misaligned or not drilled to the proper depth, or should a drill



should a hole be misaligned or not drilled to the proper depth, or should a drill break during the operation, the imperfectly drilled head cannot leave the ma-



Simply" Engine lathe OPERATIONS and Reduce "REJECTS"

with the LANE-WELLS
TOOL HOLDER

Quick Detachable heads

BORING



FORMING



FACING



TURNING



Send for Bulletin Quick detachable heads maintain precision and cut tool changing time

With Lane-Wells Tool Holder you can cut tool changing time to less than five seconds and give your engine lathe the speed, accuracy and precision of a "turret lathe." The increased production and time saved has cut machining costs as much as ½ on quantities of production pieces. Standard tool bits are used for high speed operations.

After sizes are established all readings can be taken from the cross-feed dials. Work can be interrupted and then resumed without the necessity of long tooling set up. Available for all standard engines lathes from 9" to 36" swing.

nom 9 to 50 swing.

LANE-WELLS COMPANY

Engineers and Manufacturers

5610 South Soto Street • Los Angeles 11, California



CUR

VARIABLE SPEED TRANSMISSION

For "A" section V-belts _3.3_1 speed range_perfect belt alignment in all positions. Priced so low that no shop or machine need go withoutinfinite speed selec-\$16.50

(3 Types-8 sizes to choose from)

Standard Transmission Equipment Co. 3409 VERDUCO ROAD

LOS ANGELES., CALIF.

COMPLETE THIS USEFUL TOOL FROM LEWIS CASTINGS!



This compact, well-designed Lewis Bench Mill is low in cost but tess in production when it comes to milling a wide variety of smaller parts! Furnished as either plain foundry or semi-machined castings, with all necessary materials and blueprints showing construction details. Semi-finished Mill can be completed in about 40 hours the average shop. simple lathe, drill press and hand finishing are necessary. Total cost is but a fraction the cost of comparable finished tools capable of accurate, fast production.

Deliveries are prompt on priorities of AA-5 or high-er. Illustrated catalog fully describes these and 21 other metal and woodworking tools

. . send for
your free copy MACHINE TOOL CO

teday-ne obligation. Quotations Gladly Furnished.

P. O. Box 116, Sta. A, Los Angeles 31, Calif.

Dept. Z-33

chine without being detected at once, before a second imperfect drilling operation may take place.

It is said that drill breakage is reduced materially by reason of spring compensation, resisting sudden break thru which is often experienced with hand operated

machines.

Since the center hole in head of the bolt is drilled after the horizontal holes. each horizontal drill reaches its limit and "bottoms" in the metal. Ater this, the drill coming up from the bottom cuts across the horizontal holes at right angles, as it is being fed. Therefore, all seven holes are bottomed in the metal and no burrs are evident after the drilling. Slight fins which might be left when the drills are a bit dull, are eliminated when "the inspector" passes thru and the operation is complete.

Timing of the drill movements may be changed to accommodate skill of the operator and moved up to the capacity of the

drills to remove metal.

SCHULTES DRIVES BULLETIN

Two interesting, new four-page bulletins have been issued by Schultes Tool & Eng. Co., 10318 Shoemaker Ave., Detroit, 13, Mich.

One of these booklets pictures and describes Schultes Motorization units for Brown & Sharpe Universal Grinders. Several typical installation views are shown, revealing simplicity of equipment and the ease with which it is applied.

Other bulletin presents the Schultes

four speed drive unit. A sectional view reveals the internal construction and a number of uses are portrayed. One of these is an installation on a vertical milling machine; another is a neat lathe installation. Other views show shaper and horizontal milling machine installations. An unusual setup is a unit for lapping gears in sets driven by a four speed transmission.

PEERLESS BENCH SURFACER 606

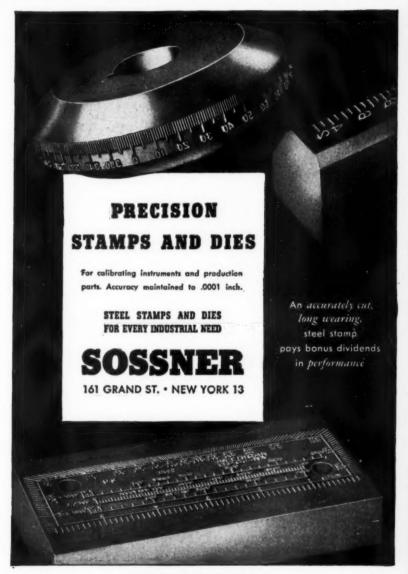
The 606-6" makes efficient use of modern the 600-0" makes efficient the or modern abrasive belts in cleaning and finishing castings, dies, stampings, etc. Gives a straight-line finish and leaves edges share, in addition to tight and leave pulleys, can be arranged for direct motor drive.

Compact, durable, smooth running, with quick easy adjustments. Also make other belt sur-facers and polishers, tool and cutter grinders and sensitive drills.

PRODUCTION MACHINE CO.

Greenfield, Dept. P





FOR FINER FINISHES

Ralance

YOUR Grinding Wheels



Your wheels can be balanced easily, quickly and accurately with this complete, inexpensive kit. A big improvement in your

> grinding finishes is bound to result.



For the whole story, write for illustrated booklet "T".

POPE MACHINERY CORP.

Established 1020

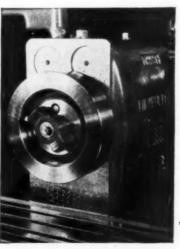
HAVERHILL . MASSACHUSETTS

Builders of Precision Spindles

FLY WHEEL ARBORS

Practical operating conditions have shown that much carbide milling is best shown that much carbide milling is best performed with very coarse toothed cutters, according to Weddell Tools, Inc. Either adequate power is lacking or work or set-up will not stand extreme pressure of closely spaced cutters. If milling cutters with conventional tooth spacing are used, chip load per tooth is so small that metal cutting is inefficient.

Hence the use of cutters with one, two, three or four teeth, or fly cutters, has evolved. However, these coarse bladed cutters give an intermittent cutting action caused by cutters bumping in and out of work. To eliminate this condition, fly wheels have been incorporated in drives. Their use tends to dampen vibration or fluttering caused by intermittent cutting. Flywheels increase effective power available to cutter, particularly if cut thru work is comparatively short. Potential energy stored in heavy rim of wheel increases considerably the force available to go thru cut. Actually, power is stored up and then expended, which of course is the purpose of any flywheel. Flywheel used should be as heavy as feasible and mounted as close to cutter as possible. By having flywheel action right at cutter, any wind-up or resiliency in drive is eliminated.



As a simple adjunct to the use of car-



Hansen PUSH-TITE air hose sockets, hose clamps and hose clamp sockets are widely used in industrial factories in all parts of the world. Mo. fuscing twisting or turning with a Hansen PUSH. sockets are widely used in industrial factories in all parts of the world. No fussing, twisting or turning with a Hansen push-nlug into socker, it is locked tight world. No fussing, twisting or turning with a Hansen PUSH.

TITE socket you merely push plug into socket, it is locked tight,
instantaneous action. To dis-TITE socket you merely push plug into socket, it is locked tight, air is automatically turned on . . . instantaneous action. To discally turned off. No wastage of air, time or effort. • The above clamp and hose clamp socket the latter a combination of the Illustration shows Hansen PUSH-TITE air hose socket, nose clamp and hose clamp socket the latter a combination of the company one company one.

clamp and hose clamp socket the latter a communation of the other two. Hose clamp has two grips instead of customary one. 1786 EAST 27th STREET

N MFG. COMPANY

bide or fly cutters, Weddell Tools, Inc., 1239 University Ave., Rochester 7, N. Y., have developed simple flywheel arbors or adaptors. The standard shell end mill arbor is replaced by a flywheel arbor which mounts on spindle. This combination arbor and flywheel has a nose, which is a replica of nose end of shell end mill arbor, onto which milling or fly cutter is fastened and driven. Flywheel arbor is made with counterbored back or locating means to fit any milling machine or horizontal boring mill. Arbor nose is made in any standard size, ¾ to 2½" diameter.

For use of cutters which fit directly on spindle, a flywheel spindle nose adaptor is offered. On this, the back is counterbored or adapted to fit machine spindle nose, while front is same as machine spindle nose, permitting mounting of standard cutter. Similar adaptors are available permitting use of taper shank cutters.

Use of flywheel arbors or adaptors allows lighter bodied, less expensive, and more easily handled cutters to be used. They are made in standard sizes, to fit standard machines, to replace standard end mill arbors—or with special amounts

of increased mass, or of special shapes to clear work or fixture set-up.

SOUTH BEND LATHE CATALOGS

Two new catalogs are announced by South Bend Lathe Works, South Bend, 22, Ind.

No. 52, an 8-page folder is devoted to descriptions and illustrations of their Series "S" precision lathes. Typical shop applications are included and informative data is also given on accuracy, durability, ease of operation and spindle speeds.

Catalog No. 901 covers Series 900 and 1000 of their Turret Lathes and contains illustrations of their precision lathes, hand lever bed turrets, universal carriage and compound cross slides. Attachments and accessories, such as hand lever draw-in collet, collet rack, electric grinding attachment, splash pan, metric transposing gears, micrometer carriage stop and thread dial indicators are also described and illustrated.

MILLING CUTTER LITERATURE

New literature covering the complete line of carbide tipped plain and side milling cutters manufactured by Super Tool



WILLEYS

DIAMOND TOOLS





WILLEY'S Diamond Tools are back again! There's a complete line, with many new improvements!



WILLEY'S method permits the complete use of the diamond, or resetting if preferred, because the WILLEY'S Metal used for anchoring has machinable properties. Setting diamonds in WILLEY'S Metal so greatly prolongs their life that small diamonds will now dress a wheel that formerly required large, expensive stones.

WRITE FOR CATALOG 41

Gives complete information and prices of WILLEY'S Diamond Tools and mechanical dressers. Write today.

WILLEY'S CARBIDE TOOL CO.

1340 W. Vernor Highway,

(1) Detroit, Michigan

Co., 21650 Hoover Road, Detroit 13, Mich.

is now being distributed.

Complete details, specification and prices are given for general purpose cutters for milling in cast iron, non-ferrous and other materials and for cutters designed specifically for carbide tipped milling in steel. An attempt has been made to answer any question that might arise in the mind of the purchaser so that he can order directly from this literature.

CUTTER GRINDER FIXTURE

An interesting, new Box Mill Cutter Grinder Fixture has been developed by Equipment Mfg. Inc., 8646 Grinnell Ave., Detroit, 13, Mich.

The particular application illustrated shows grinding of cutters for Warner & Swasey box mills. The fixture can be made for any of the well known makes of machines, on short notice.

Applications have been made for patents. The fixture can be used for all sizes of cutters. Important angles are predetermined and ground accurately to bring tools back to their original condition.

This new fixture may be used for grinding carbide tipped cutters, or high speed cutters and is adaptable to any surface grinder. It is made of tool steel, hardened



and ground to preserve accuracy of the angles.

It is asserted that with this fixture, any apprentice can grind tools to the rigid limits of accuracy required in modern precision cutting.

WESTINGHOUSE COMPRESSORS

In a well-illustrated and informative 8-page folder, Westinghouse Air Brake Co., Industrial Div., Pittsburgh, Pa. gives timely and interesting data on their in-dustrial air compressors of many types, Accessories are also included.



When a job calls for two or three toot changes and a cutting-off operation, use a Colwell turret. For an Colwell turrets, standard cutting-off tool, beveled on both sides so that it clears itself, is mounted directly in the turret, without the use of a toolholder. Saves you the time and trouble of grinding down a square tool bit. Write today for our new folder.

S.G.COLWELL 25 Congress Ave., Prov., R.I.



WEBER ADDRESSING MACHINE CO.

537 South Dearborn Street

CHICAGO 5, ILLINOIS

The Complete Line of Gear and Wheel Pullers



Write for Catalog Sheets

showing STEELGRIP Standard 2 and 3 arm Wheel Pullers, special Battery Terminal, Pitman Arm, Fan Pullers and CHAINGRIP Universal Pullers.

ARMSTRONG-BRAY & CO. "The Belt Lacing People"

5364 Northwest Highway Chicago 30, U.S.A.

HAMILTON SWISS TYPE GEAR HOBBE

... for Accuracy and speed in hobbing PINIONS GEARS and SECTORS

TWO MODELS

No. 00 SPUR GEAR HOBBER (Illustrated) for work up to 2" diam.

No. 1 SPUR and SPIRAL GEAR HOR-BER for work up to 6" diam.

Write for further details to

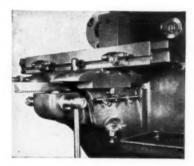
TRIPLEX MACHINE TOOL CORP. Exclusive Sales Agents 125 Barclay St.

Manufactured by The Hamilton Tool Co. Hamilton, Ohio New York 7, N. Y.

NICHOLS TRANSVERSE FEED MILLER

A new development in the form of a Lever, Rack and Pinion transverse feed arrangement for Milling Machines is announced by sole distributors, The Nichols-Morris Corp., 50 Church St., New York, N. Y. This adaptation is believed to be unique on milling machines. It can be substituted for the regular transverse feed screw to give added operational flexibility.

It is stated that this optional means of rapid transverse table travel has been thoroly tried, with considerable success on difficult production jobs. It is expected to prove of interest to many users of this high-precision type machine tool, made by W. H. Nichols & Sons, Waltham, Mass., successor to the old familiar Whitnev Miller.



According to the makers the main advantage of rack and lever transverse feed is that it gives to the milling machine table and saddle, the flexibility of move-ment found in the conventional lathe car-riage and cross slide. Work can be chuck-ed lathe-fashion on the spindle with tools mounted on the table, or vice versa. This feature of rapid transverse motion, combined with high spindle speeds and carbide-tipped tools makes it possible to use the Miller for borizing, facing, counterboring, turning, profiling and recessingoperations usually assigned to precision boring machines and too!makers' lathes. Close tolerances can be held on repetitive operations by means of adjustable stops. For extremely close work, dial indicators can be mounted on convenient finished surface



NOPAK Model R. 2-3-and 4-way Foot Valve with spring return may be adapted to a wide variety of operating cycles,

NOPAK Foot Valves Leave Both Hands FREE!

Foot control of air or hydraulic machine movements has proved valuable in speeding up production on a wide variety of applications. It leaves operators' hands free for other tasks, reduces fatigue. NOPAK 2-, 3- and 4-Way Foot valves are built in Spring Return, Ratchet and Double-Treadle Types, affording various operating cycles for the control of single and double acting air or low pressure hydraulic (either water or oil) cylinders. Write for Bulletin 86.

GALLAND-HENNING MFG. CO., 2754 S. 31st., Milwaukee 7, Wis.

Representatives in Principal Cities OPAR VALVES and CYLINDERS or HYDRAULIC SERVICE DESIGNED for AIR

NOPAK Model F. 2-3-and 4-way Foot Valve with ratchet pedal is particularly adapted to applications where operator must leave valve location after applying pressure.



* CENTERLESS GRINDING

Straight Cylindrical, Shoulder, Profile, and Multiple Diameters . . . Long Bar Grinding Ground Taper Pins and Dowel Pins.

Screw machine products. Heat treated and ground if necessary. Improved and expanded facilities assure prompt and accurate service.

Send your blue prints or samples for estimates.

PORTER MACHINE COMPANY 3100 Enyart Ave., Oakley, Cincinnati, O.



All grip—no slip . . no bearings, friction, heat or lost power . . push out type . . full spindle capacity or over . . automatic adjustment . . work re-set without stopping lathe . . 2 sizus, 1" and 2" capacities . . order now with proper priorities.

Immediate deliveries.

HALL MANUFACTURING COMPANY 622 Tularosa Dr. * Ph. NO 9679 * Los Angeles 26, Cal.

Other advantages of this arrangement, the manufacturer points out, are that the Miller employed in this way takes up less floor space than a corresponding boring machine or lathe; the operator has better visibility of the work and more convenient working position; initial investment is less. At the same time, the machine's original purpose as a miller is not altered.

DELTA INDUSTRIAL CATALOG

A new, 52 page catalog No. 11 has been issued by Delta Mfg. Co., 605-A E. Vienna Ave., Milwaukee, 1, Wis, All of the different Delta products are shown, with full mechanical details. Numerous pictures show typical installations and applications. A great many accessories and attachments are included. The book contains much instructive and interesting material.

MIDLAND BROCHURE

An especially attractive brochure—
"Shaping Tomorrow Today" is announced by Midland Die & Engraving Co., 1800 Berenice Ave., Chicago, Ill. The firm believes this booklet will help the reader to gain an understanding of an increasingly important factor in manufacturing namely, the steel mold for plastics and die cast metals. The colorful pages present an interesting account of war-time activities of the company, and also points out what they hope to accomplish in peacetime.

An additional bulletin also stresses the importance of Hobbed Cavities in the Plastics Industry.

PIPE BENDING FOLDER

A 6-page folder released by American Pipe Bending Machine Co., 37-39 Pearl St., Boston 10, Mass., contains pictures and sketches of their pipe, conduit and tube bending machines. Desirable qualities of their present equipment are stressed and typical installations shown.

BABY GIANT ANDERBEEK Universal Joints

are obtainable in two sizes—the "Baby Giant" for instrument and control work; and the "Giant", with hardened and ground working surfaces for heavy duty work.

Send us your requirements - We'll send you prices.

AMERICAN TOOL WORKS. INC. 26 FRANCIS AVE. HARTFORD, CONN.





For your special cutting tool orders we have modern equipment, skilled workers and the "Know How" to insure accuracy and fine workmanship. At present we can offer attractive deliveries for all types of cutting tools.

Send your inquiries for special cutting tools to A. C. E. Bulletin on request.

AMERICAN CUTTER & ENGINEERING CORP., 31741 Mound Road, Warren, Mich.

AMERICAN CUTTER

AND ENGINEERING CORP., WARREN, MICH.

SPECIALIZING IN HIGH SPEED CUTTING TOOLS TO YOUR PAINTS

WORK AROUND THE CORNE

MILLER

FLEXIBLE DRIVE SOCKET SET

FLEXIBLE SCREW DRIVER

MILLER FLEXIBLE SCREW DRIVER—A practical, durable screw driver that actually "works around corners." One of the most valuable small tools ever put into a shop.

Saves loss of time and temper on jobs in awkward places that can't be reached by a straight or offset driver. Laminated steel shaft; specially hardened screw driver bit. Shock-proof handle. Length overall 8". Price, 85c.

Efficient in production and assembling operations or for servicing small machines

MILLER FLEXIBLE DRIVE SOCKET SET—Same construction as Screw Driver. Set contains 6 Hex Sockets from 3/16" to 1/2" and flexible drive 10" long. All packed in handy metal box. Price, \$3.00.

Obtainable under CMP-5 - MRO.

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2123 Avenue U

Brooklyn, N. Y.

Shaft of Laminated Steel Wire, not

Laminated Steel Wire, not a Coiled Spring.

U. S. Pat. 2,023,693



You'll wonder how you ever got along without it.



TO HELP YOU DO BETTER WORK Faster!

AMERICAN HOLE CHECKERS AMERICAN BENCH CENTERS

AIR-OPERATED HOLE CHECKER — Checks inside diameters to ten thousandths. Quickly determines size, taper, bell-mouth and out-of-round condition. Specially designed sizing plugs are made for your production parts. Can be used on any number of hole sizes by simply changing plugs.

The American Hole Checker is operated by controlled air pressure and volume. Dial can be calibrated so that graduations register .0001".

IMPROVED BENCH CENTER — Three sixes; for checking work up to 4" dia. x 10"; 6" dia. x 24" and 8" dia. x 36". Additional diameters possible by use of raising blocks.

Adjustable heads easily slid into position. Clamping levers hold heads in adjustment. Retracting lever permits quick removal of work. Special large size center fixtures and bull centers for checking practically any diameters.

Box-type bed supported on three legs, always sits solidly on bench. Bed inclined 30° to facilitate handling of work and prevent its misuse as "catch-all". Indicator bracket and holder carries a .0001" dial indicator and is readily adjustable to all positions.

Send for Bulletin 43-BB and prices on American Tools and Gages. Your inquiry solicited on special tools, dies and gages.





Hole checker and sizing plugs.



Note convenient working position at Bench Center.



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125 Bayard St. DAYTON 1, OHIO

Mark It Quickly with a NUMBERALL

Made with 1 to 20 wheels. Stamp in perfect alignment. Shank for Hand or Press Stamping. Platform for stamping Name Plates and other small articles. No. 45 Platform

NEW Quick Set Ma-chine. One wheel can he turned quickly by knurled knob for consecutive numbering.

NUMBERALL STAMP & TOOL CO.

Huguenot Park. Staten Island 12, N.Y.







AXELSON CAN SOLVE YOUR GAGE PROBLEMS

Today's complicated manufacturing operations demand a wide variety of accurate working and inspection gages. Axelson can produce gaging equipment of any type-thread gages, plug gages, special angle gages-gaging fixtures, jigs-hobbs, reamers, taps, and milling cutters. Fifty years of manufacturing have given Axelson the broad experience needed for fine gage making. Submit your gage problems to Axelson today!

AXELSON MANUFACTURING CO. 6160 S. BOYLE AVENUE (BOX 98, VERNON STATION) LOS ANGELES 11, CILIF.

50 Church St., New York 7; 3844 Walsh St., St. Louis 16; 204 Munsey Bidg., Washington 4, D. C.

ALMOND

TRIPLE JAW DRILL CHUCK



ALMOND Three Jaw Drill Chucks are widely used for holding drills, taps, reamers and other tools, and are always used in connection with and by being mounted upon some form of machine tool such as drill press, lathe, or milling machine. Also used on portable tools, principally electric and pneumatic drills.

ALMOND Three Jaw Drill Chucks were the first to be placed on the market; they are the pioneers of the field. These years of research and top material going into their production have made them outstanding in the field.

WRITE FOR DETAILS

T. R. ALMOND CO.

ASHBURNHAM.

MASS., U.S.A.



"Let Us... Recondition Your Tap Extractors"

48 Hour Service

Send us your damaged tap extractors. All broken holders, collars and sleeves will be replaced without charge. Steel fingers replaced at standard list prices. Put your Waltons in condition now. Idle tools cost you money.



- * No annealing
- * No drilling
- * No damaged threads
- * No costly delays

Immediate Shipment. Stock sizes No. 4 to 1½", 2, 3, 4 flutes. 30 day free trial.

Write for folder No. 12.

The WALTON Company 94 ALLYN STREET · HARTFORD, CONN.

KEEPING MEN ON JOBS

By Frank V. Faulhaber

"A battleship could be built with the time that goes to waste here!" observed a toolmaker, referring to another employee seeking the machine shop foreman for further instructions. The foreman was nowhere in sight. The seeker having finished his last job was waiting for his next task. By the time the foreman came along from another department, considerable more time had gone to pot. Meanwhile there were others with problems

ished his last job was waiting for his next task. By the time the foreman came along from another department, considerable more time had gone to pot. Meanwhile there were others with problems

Write for descriptive literature

Made in various types and sizes from 1/30 to 2 H.P. Pumping capacity up to 200 g. p. m. Many patented and exclusive features.

THE RUTHMAN MACHINERY CO. 1808 Reading Rd. Cincinnati, Ohio to discuss with the foreman, who finally got around to assigning another job. The incident was representative of many others.

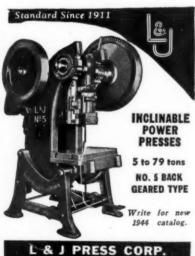
It happens even in large machine shops at times, but notably so in smaller plants. There, most of the responsibilities rest directly upon the foreman, who delegates the various tasks with no particular timesaving and systematic efficiency. An employee may finish a small job and then have to hunt out the foreman, wherever he may be, with all the ensuing time waste. No sooner is one small job completed than this rigmarole is repeated. Aside from the profit and time losing absurdity of it all, such a situation entails, also, a nervous strain on the part of the foreman.

All this can be speedily overcome, as proved by one small progressive Brooklyn establishment. Having been beset with such a condition, the management decided to issue special work-cards to all employees, some of whom sometimes undertake several different jobs in a day. Naturally it was desirable to keep these men steadily at work, as far as possible, without needless wasteful intermissions and attendant costly delays.



HIH RESEARCH CO

37 MARQUETTE DLDG . DETROIT 26, MICH.



successors to Lushhough-Jordan Tool & Machine Co.

1624 STERLING AVE

ELKHART, INDIANA

ERRINGTON MECHANICAL LABORATORY

MAIN OFFICE AND WORKS: STATEN ISLAND, NEW YORK

Chicago Office: 6701 N. SIOUX AVENUE New York Office 170 BROADWAY



Thread Ring Gages Reworked!



NOTE: When sending special pitch-diameter gages, be sure to send also the setting plugs.

WORN GAGES MADE LIKE NEW!

Ship us your worn thread ring gages and let us give them a new lease of life! We re-lap the worn threads on pitch diameter, re-lap the major diameter to sharp V. eliminate bell-mouth, enlarge the slots, and replace worn bushings, adjusting screws and locking nuts when necessary.

Unless the gages are so badly worn that they are hopeless, we make them as good as new—at a saving of 30% as compared with the cost of new gages.

Quick Delivery on Standard Plug and Ring Gages

SCIENTIFIC GAGE CO.

15922 Fenkell

Detroit 27, Mich.

A definite amount of time is allotted for the different kinds of work. A specimen card covering a day's work may indicate that the employee is start at 8 o'clock finishing up the previous day's lathe work, which the department foreman figures will last until 9 o'clock. From 9, accordingly, the card signifies this workman is to take on a job at a drill press, until dinner time. From 12:30 until 3 he is to blank out plates on one of the power presses, and thence he is to punch multiple holes on some work on another power press, which his card indicates is Press No. 3 This machine is set up by the head press man, thus averting delay and the operation is to occupy the worker for the remainder of the working day.

Thus, in plain black and white, a given employee knows precisely the nature and amount of work expected of him, for the day, over stipulated periods. And all the work is methodically planned, notwithstanding the variety of many small jobs, to eliminate possible time wastes. This is especially important for the smaller plants, where such troubles are more bothersome and flagrant.

Said the foreman of the press department, in explaining these cards:-"Before we used this little idea, considerable time and effort were wasted and there was much inefficiency. An employee frequently would hold back when he was uncertain of his next job, because, naturally, he preferred to keep busy. Our employees work mostly on a day basis, and it is desirable in our own interests that each man be profitably occupied. As it is now, it is unnecessary for me to be disturbed so many times during the day, when I may be concentrating on some intricate problems. By reason of these cards, all this is allocated for, systematically, far enough in advance so that we are always ahead, never behind. This is another noteworthy feature.

"I am not always in the shop, and tho my department can function without my presence all the time, I know this was a serious hindrance previously, when our men worked hit-and-miss fashion.

"Using the cards is a simple way of keeping these people more regularly employed. There is less uncertainty and more efficiency, since we mark out the cards in such a way that no man will be found without work, with incident systematization, whereas formerly an operator sometimes couldn't proceed on a new job because the preceding operation had not yet been completed.

"This plan, incidentally, serves to give us a better idea when a given order will be finished. It facilitates the operations, and rarely does it happen now that one man has to wait for work because the preceding operation has not yet been started."

Such special work cards are also serviceable particularly in the case of new, inexperienced employees, who sometimes do not inquire of a superior upon completing one job, waiting instead until the foreman prompts them with additional fresh work. Besides, it eliminates the necessity of indiscriminately assigning impromptu tasks and fill-in jobs not intelligently scheduled. Such cards, moreover, can apply over longer than daily schedules:—3, 4 and more days, as de-sired. Too, the cards eliminate misunderstandings and mistakes, since instructions and vital data may be recorded thereon. Finally, the cards give an accurate record of specific jobs performed, by whom, when, how much, and how long, and also on what machines when such information is important.





Easy Mounting
Large Quill —

4" travel
counter balanced,
hardened, and
ground
6 speeds
250 - 3000 RPM
Lever and Worm
Feeds

Specially engineered by RUSNOK to meet the demand for heavier duty end mill operations. Uses many types of cutters on a wide range of work. Large size spindle (No. 9 B & S taper). The control of the co

Write for descriptive folder.

RUSNOK TOOL 4840 North Avenue, WORKS Chicago, III.

WAR or POST-WAR

Production Capacity

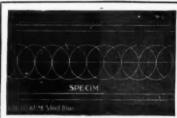
We are now in position to take on some additional work. Our plant is ultra-modern with finest equipment. Our staff has had more than 34 years of experience in management, engineering, designing and production—skilled in handling war contracts for large firms—quickly and efficiently.

SEND BLUEPRINTS FOR QUOTATION

Use Our Complete and Modern
DESIGNING, ENGINEERING, DRAFTING
and INSPECTION Service and Equipment

DEFIANCE METAL PRODUCTS COMPANY

Contract Die and Tool Work
Commercial Stampings
Zachrich Bldg., Defiance, Ohio
Telephone 170



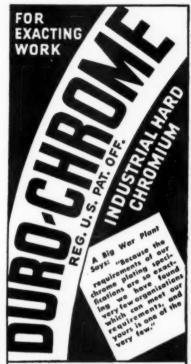
DYKEM STEEL BLUE STOPS LOSSES making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed; layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY 2301G N. 11th St., St. Louis, Mo.

(In Canada: 444 Pacific Ave., Toronto, Ont.)



"UP" THE PRODUCTION of your dies, molds, plug gauges, punches and tools with DURO-CHROME hard chromium, applied with DURO-CHROME skill and experience. Salvage worn parts by building them up with DURO-CHROME. Now equipped to take on more business from War industries. 'Round the clock operation to help you keep production schedules moving.

DURO-CHROME A DIV. OF VACUUM CAN CO. 25 SO. HOYNE AVE. SEELEY CHICAGO 12, ILL.

GRINDING WHEEL DATA

Grinding of carbide tipped tools has expanded rapidly during the period of war effort.

Many grinding wheels for this purpose are mounted on steel plates. Because of this unusual mounting, confusion has arisen in distinguishing the wheels used on different makes of grinders. There is a wide range of wheel sizes and drillings on the steel plates of the several makes of grinding machines.

Waltham has compiled a listing of complete specifications of all wheels and mounting plates used on well-known machines. They believe general distribution of such information to users of platemounted wheels will be of real assistance to purchasing, stock control and production departments, as well as simplifying the problem for all grinding wheel manufacturers.

Copies of this listing, in sufficient quantity for use thruout a plant, are available. A listing of standard sizes of straight wheels commonly used in sharpening carbide cutting tools is also available. Address Waltham Grinding Wheel Co., 15 Emery Street, Waltham, Mass.

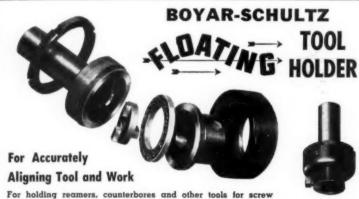
ABRASIVE LITERATURE

Mounted Point Catalog Form ESA-61, and Cemented Carbide Folder Form ESA-68, have been issued by the Abrasive Co., Tacony & Fraley Sts., Philadelphia, 31, Pa. The first mentioned is a 28-page, handy size, which discusses the use and convenience of their abrasive points which are quickly applied to the demountable spindles. The economy of this handy design, range of abrasives and mechanical construction are discussed. Typical shop views show equipment in actual use.

The 6-page folder ESA-68 gives a brief discussion of the merits of their grinding wheels and also gives several interesting tips on grinding carbide tools.

CLEVELAND TAPPING RELEASE

Two attractive and interesting four page folders, devoted to descriptions of their Model DB lead screw and Model D precision tapping machines have been issued by Cleveland Tapping Machine Co., 1724 Superior Ave., Cleveland 14, Ohio. Details include information on control, table, spend, and lead screw and one full page is devoted to specifications of each of these machines.



For holding reamers, counterbores and other tools for screw machines. Simple in design, nothing to get out of order. Circular ball race provides full circle bearing surface on hardened and ground steel ways. Easily adjusted.

BOYAR-SCHULTZ CORPORATION

2108 Walnut Street,

Chicago 12, III.

SAVE TIME and LABOR HANDLING PARTS and MATERIALS

Patented Stackbins keep parts and materials instantly accessible—eliminate waste hand motions—stack rigidly to form units of exactly the right shape and capacity at the point of assembly—save time and labor handling parts and materials.

We have been given permission by WPB to manufacture Stackbins to be used as portable containers for production and assembly.



STACKBINS
"STACKED AND STILL ACCESSIBLE"

Write today for full details and prices on all-weided steel **Stack-bins**. Stackbin Corp., 55 Troy St., Providence, R. I.

simplified grinding

with PARKER-MAJESTIC

Internal and External Grinders

For precision grinding . . . internal or external . . . Majestic simplicity of design and flexibility of changeover guarantee maximum grinding output at low cost.

Send for descriptive circular .. NOW!

Representatives in all principal cities





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This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

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1D 2D	31/2	31/2 51/2	121/2

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We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

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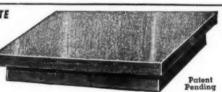
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Herman PRECISION GRANITE Surface Plates eliminate once and for all the disadvantages and uncertainties of old-fashioned metal surface plates. Cut from solid granite, they cannot warp and will remain accurate to 1/10,000 inch overall. Practically non-porous, they do not become charged with tool damaging abrasive particles. Corrosion and rust-proof, they are as nearly indestructible as man and nature can make them. Already scores of shops throughout the country have declared them unequaled for precision work. Let Herman PRECISION GRANITE Surface Plates increase production efficiency and economy in your shop. Write today for information,

Standard Sizes and Weights

12"x18" - 75 lbs.

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good job powering machines for defense production. No noise, floating cone, results 100% power. 8 years of production

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UNIVERSAL ENGINEERING
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A new exposed lamp type fluorescent luminaire called Lightronics has recently been developed to conform with W.P.B. weight limitations. It provides high-intensity illumination for offices and drafting-rooms in this nation's warplants.

The light has a full top-housing which totally encloses and protects all accessories and wiring. Of unique design, the new top-housing has strength by design, due to its ingenious metal folds.

It is equipped with a Masonite reflector, finished "300" White" which is claimed to reflect over 75% of the light to the working plane. It also provides some upward illumination for softly lighted ceiling.

Designed for close-ceiling or suspended mountings, these lights are installed as units, or end-to-end in continuous-runs. The 48" long units can be had for use with either 2-40 watt, 3-40 watt, or 4-40 watt fluorescent lamps. They are available with conventional ballast and starter-switches, or with the new Super Powered Quick-Liter ballast which uses no Starter Switches, lights quickly, operates at lower voltages and at low temperatures. Lightronics are available for immediate shipment from The Edwin F. Guth Co., 2615 Washington Ave., St. Louis 3, Mo.

QUEEN CITY CATALOG

An interesting 20-page catalog illustrating a complete line of grinders and buffers, has been issued by Queen City Machine Tool Co.. 239 E. Second St., Cincinnati 2, Ohio. This new catalog shows representative types of Queen City Bench, Heavy Duty Box-Type, and Pedestal Grinders; combination buffers and grinders; heavy-duty buffers; and disc grinders. These machines have a range of 1/3 to 10 hp in capacity. Complete specifications, prices and operating details of the various models are included.

Determine Surface Flatness to Millionths of an inch with

* Deviations from absolute flatness can be going littless can be quickly and easily de-termined in millionths with the aid of Acme Optical Flats and Monochromatic Lamp.

Illustration shows interference bands reflected from a truly flat surface as they are seen through an Acme Optical Flat. The straightness of the bands determines the flatness of the surface.

ACME

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Makers of Standardized Jig and Fixture Bushings

ANOTHER HIGH PRODUCTION SPECIAL MACHINE Designers and Builders of High

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The MACHINE ILLUSTRATED

is a Double-End Hvdraulic Machine equipped with Trunnion type index fixture for DRILLING . . . ROUGH BORING . . . FINISH REAMING . . . UNDER-CUTTING . . . Piston-Pin Hole in piston . . . Two complete pistons in one DOSS.

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6-7 Weeks Delivery on Special Gauges, Plug or Ring

Avoid rejections. Check all threads with our precision gauges. All sizes to order from 0-80 NF to 12-inch diameter in NF, NC, NS, Acme, metric and special pitches. Send blueprints or specifications today for auotations.

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ARC WELDING SPOTLIGHT



A spotlight designed to provide glareless illumination of sufficient intensity for an arc welding operator to see his work distinctly thru the dark glass of a welding helmet prior to striking the arc, is offered by Electric Welding Division of General Electric Co., Schenectady, N. Y. The new spotlight (Cat. 89X291) is especially desirable for production-line weld-

ing in which establishment of the arc must be made quickly and accurately, such as in welding thin materials, light alloy castings, and aircraft parts.

ABRASIVE DATA BOOKLET

A second Basic Information Booklet on A second Basic Information Booklet on Coated Abrasives follows closely Booklet No. 1 for Distributor Salesmen, published by Behr-Manning, Troy, N. Y. So great was the demand for the Distributor Book that this firm has provided a revised edition for buyers and Users of Coated Abrasives. The booklet is a downto-earth discussion of Coated Abrasives. component parts, manufacture, and ultimate use, including information on how to identify, how to order, and how to store Sandpaper—28 pages of excellently written, well-illustrated information.

HOLLIDAY ISSUES CATALOG

A handsome, new 32-page catalog has been issued by W. J. Holliday & Co., Hammond, Ind. It presents considerable information pertaining to the company's Speed Treat and Speed Case Plate. Much technical data is included along with numerous pictures and descriptions of machine tool and other parts made of these versatile steels.

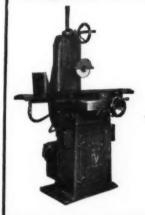


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Produces low cost, accurate keyways. Eliminates set-up time. Self aligning. Interchangeable parts. Adapted for arbor press, mechanical or hydraulic pressure. Speeds up production. Cutter bars in carbon or high speed steel. Details ? Write!

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9" - \$ 97.00

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USED FOR ALL KINDS OF WORK ON MILLING MACHINES, SHAPERS, DRILL
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WE CAN ALSO FURNISH DIVIDING ATTACHMENTS.

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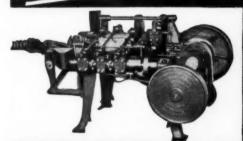
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THE NILSON
AUTOMATIC METAL
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MACHINE



The Nilson Automatic Metal and Wire Forming Machine meets today's industrial requirements. Here are some of the features of this machine: Open construction of press and forming tools. Patented slide feed with an independent cam-operated wire gripping device. Power operating wire feed is transmitted through a straight line.

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The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in 1/4" to 1" diameters. Sendfor price list.

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SOCKET HEAD CAP SCREWS

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SAVE TIME ON WAR ORDERS!

If you're cutting straights or irregulars on War orders you can speed 'em up with a BEVERLY Bench-Type Shear. Order No. 1 for 14 Ga., No. 2 for 10 Ga., No. 3 for 3/16⁸ mild steel and 10 ga., stainless.

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A recent addition to the COLBORNE line of Speed Lathes is the Series 30 machine. This speed lathe is indispensable for economical polishing, grinding, burring and lapping.

Very compactly constructed to do highest quality work with the COLBORNE features of spindle bearings running in oil, instant stopping brake, easy opening collet and standard speeds of 600-920-1720-3280-4800 RPM using 34 H.P. motor and cone pulleys. Collets and chuck may be used.

For more production per day choose COLBORNE.



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The No. 141 Bench Type Metal Working Band Saw Welder is available with or without grinder. Work can be annealed without removing from the Welder. Band saws up to \(^4\)" wide may be welded. 220 and 110 Volt. 80 Cycle, single phase, 5 point heat control, 1 point anneal heat. Shipping weight 79 lbs. Let us send you further details. further details.

Mfrs. of complete line of Spot, Butt, Seam, Flash, Projection and Special Welders,

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SAFETY "WEDGE GRIP" STEEL HAND STAMPS



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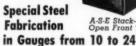
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THE WONDER CUTTER

Cuts wire or rod up to 5/8 inch round (% inch square) and band iron up to 1/8 by 2 inches. Adjustable stop for repeated cuts to same length. Hardened cutters last indefinitely.

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Powerful leverage makes all cuts easy. Small size permits placing wherever convenient. Small in size but a giant for work. The lowest priced rod and band cutter ou the market. Every shop needs one. Hundreds in use.

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Wizard Electric Counters count anything that will operate a switch, relay or photo-electric cell. They are being operated by the sound of falling parts. May be located at any distance from the source of count.

Every part is designed for electrical operation and heavy duty industrial service.

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For SLOW SPEED DRIVES

Speed reducers provide a practical, economical, quiet, efficient, compact, low maintenance cost method for obtaining positive slow speeds from high speed motors.

Janette reducers are bulli in either motorized or motories styles, with foot or flange mountings, and can be furnished with Janette ventilated or enclosed motors, designed for standard and special applications.

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YOUR FIRST LINE OF DEFENSE against

HIGH SHARPENING COSTS

No. 57T Automatically Sharpens Metal Saws in gangs up to 88 in diameter.

Takes gangs up to 31/2" thick. The saws are automatically indexed and sharpened within variation of plus or minus .001 of exact diameter of entire lot.

> Write for Folder 57T.

THE WARDWELL MFG. 3165 Fulton Rd. Cleveland 9, Ohio

THREAD GRINDING BULLETIN

A "how to do it" bulletin on thread grinding has been published in keeping with interest on "know how" information and increased war production speed by the Dumore Co., 14th & Racine Sts., Racine, Wis.

This six page, two color instructional bulletin is profusely and clearly illustrated to show typical thread grinding operations, samples of thread grinding done by this method, wheel dressing and the six simple steps required to mount a Dumore No. 5 Toolpost Grinder (1/2 hp.; up to 42,500 rpm spindle speeds) and the Thread Grinder Attachment to the lathe in preparation for thread grinding.

Since it is possible to grind either U.S. Standard or Acme Threads with this attachment and the Number 5, complete helical angle tables for both types of threads are given for settings on grinder and dresser. Both Standard and Acme dressers are shown, with instructions for dressing wheel and relocating it accurately after dressing in the partially ground thread. Copy of Bulletin No. 25 may be had on request.



EMERY WHEEL DRESSER

Dresser That is Mechanically Correct, Built to Outwear Ordinary Dressers Many Times

The life of the dresser is in the cutters. A special steel is used, made to rigid specifications. They are heat treated and tempered by a special process insuring sharp dressing points until completely worn

Correct cutter mounting prevents "wobbling". The cutters, mounted on a sleeve, revolve on the spindle eliminating "grooving" and providing true contact for the life of the cutters.

Holders designed for safety and permanence. There are no moving parts—nothing to wear. Clamping is

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We are emery wheel dresser specialists.





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THE GAIRING TOOL COMPANY, Detroit, Michigan

The set illustrated here consists of one Type A-1 holder. 9 cutters ranging from 1/4" to 1/2", 8 pilots from 5/32" to %", 2 countersinks 1/2" dia., 70° and 82°.

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A new "Hi-Stress" Speed Nut. conforming to AAF specification No. 25531, has been developed by Tinnerman and approved by the Army Air Forces. This new nut is a lighter weight, one-piece integral unit with an unusually low installation torque that allows speedier insertion of screws and bolts. It is interchangeable with nut plate AN362, for



high temperature applications in all structures. Another feature stressed is that it retains its self-locking torque even after many removals under service conditions. It is identified by No. A6103H-032 and manufactured by Tinnerman Products, Inc., 2104 Fulton Road, Cleveland 13, Ohio.

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Foundries are not ordinarily that of as photogenic, yet a recent book shows that beauty can exist even in a foundry.

In this 20-page book, Manufacturers Brass Foundry Co., 7756 Dante Ave., Chi-cago, 19, Ill. takes the reader on a personally conducted tour thru its new plant. Every step in producing quality brass and aluminum castings is pictured by the gifted camera of Torkel Korling, in a series of striking photographs; to create a clear impression of the last word in modern equipment, manned by seasoned veteran craftsmen. Copies are available upon request.

WALES-STRIPPIT CATALOG "E"

WALES-STRIFTT CATALOG E. Wales-Strippit Corp., 345 Payne Ave., North Tonawanda, N. Y. announces their new Catalog "E" which illustrates and describes their popular hole punching units. These units eliminate one of the most difficult problems in fabrication; that of punching a series of holes simultaneously in extruded and shaped section. This 12-page Catalog contains many help-ful and informative details concerning Wales products.



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PROMPT DELIVERY ON PLUG GAGES .030' to 8' i

Extraordinary Improvement in Adjustable Snap Gages with Ball-tipped anvil and amazing positive locking system cannot get out of set.—Pat. Applied for.

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If your inspection demands surface plates of highest precision, follow the lead of outstanding aircraft and ordnance plants everywhere. Plates produced by the superior Smith process are accepted as standard for close tolerance work. Many standard sizes available for immediate delivery. Write, phone or wire for prices and delivery.

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Greatest

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For heles from '\u00e5" upwards, 15 dif-ferent sizes. The accurate thread angle in maintained through each sharpening until tool is entirely worn down. Small head-long cutting surface for regrinding.

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Pictured-

6 Spindle Head and Bushing Plate with Self Clamping Fixture.



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MOTOR DRIVE

Prompt Shipment



Save floor space, save power, and eliminate line shaft expense by installing MODERN MOTOR DHIVES in your plant. All drives are ball-bearing equipped and designed to fit practically every machine tool. Soundly engineered for long life.

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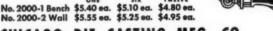
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"SPOTS-LIGHT WHERE IT IS NEEDED'

No. 2000-1 Bench \$5.40 ea. \$5.10 ea. \$4.80 ea.





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REVERSIBLE SHEAR, PUNCH AND PRESS No. 10

Expensive dies can be eliminated and readjusting of standard production machines avoided thru use of this machine. It provides the necessary facilities in large production plants for completing patterns, jigs, templates, samples, etc.

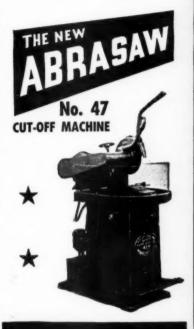
It is also indispensable in job shops where sheet metal is fabricated, involving punching of holes or shearing of penings in any location to the center of 42", on sheets up to No. 12 gauge.

Many jobs can be entirely completed on a single No. 10 unit, which would otherwise require three separate machines—on operations such as stoves, ranges, signs, cornice and architectural work, store equipment, etc.

This sturdy 800-lb, machine will stand up in hard service and prove a profitable investment in any shop.

Write today for further details.

EXCELSIOR TOOL & MACHINE CO. EAST ST. LOUIS, ILLINOIS



This pedestal type machine—improved and streamlined in appearance and construction — provides machine and base in a single casting. Large coolant tank in base of machine—with coolant pump at the rear.

Vises can be furnished for straight or combination straight and angle cuts.

Capacity: solids up to 1" tubing up to 2"

Our No. 48W has capacity: solids up to 21/2"

tubing up to 3½"
Also manufacturers of:

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This is a special gage, but still a necessary tool to check ball fittings. The tool steel gage member is a true spherical segment securely attached to a knurled handle. It is claimed to accurately gage ball socket or spherical concavity and instantly reveal any errors of machining. It is made in "Go" and "No Go" types.

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Information on their gage products may be had from Vard Inc., 2961 E. Colorado St., Pasadena 8, Cal.

MOTOR-INDEXING FIXTURE

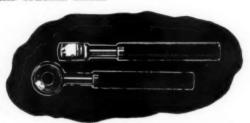


The illustration shows a U. S. Multi-Miller equipped with a Motor-Driven Automatic Indexing Fixture.

This fixture is a self-contained unit having its own motor and is simply set on the milling machine table. Standard equipment with the fixture includes one Index Plate to give the range of index. Of course, one plate cannot be used to obtain all degrees of index. However, extra plates for use with the fixture can be obtained. This fixture was made by U. S. Tool Co., Inc., Ampere, (East Orange) N. J.

STERLING EASYMOUNTS

An interesting new development in grinding practice is announced by the



Sterling Grinding Wheel Div. of The Cleveland Quarries Co., Dept B, Tiffin, Ohio. Of special interest to carbide tool grinders, Sterling's innovation involves grinding wheel mounts with replaceable wheels. The user purchases an Easymount or wheel carrier and then applies grinding wheels as needed. The manufacturers emphasize that the first cost for the mount is the last. Once fastened to the grinder, the Easymount stays on and all that's necessary is to replace worn wheels. The wheel slips into place easily and is secured by retaining screws around the periphery.



Sterling also announces development of a new bond for the wheels which is said to impart better cutting action and to provide longer wheel life.

Easymounts and wheels are available in sizes and types to fit various types of carbide tools and grinders including Sellers, Heald, Excello, Baldor, Hammond, Delta, Prosser, etc.

Wheels are supplied in coarse grain for roughing, medium for semi-finishing, and fine for finishing.

NEED SOLANT PUMPS? BADY-PENEOD MODEL 7500 Centrifugal coolant pump and tank—a need length suitable for use where highly suitable for use where

Good pumps PAY. Buy the kind used as standard equipment by many leading machine tool manufacturers—BRADY-PENROD. Model 7500, shown above, is one of a complete line designed to meet every need. It handles all coolant liquids—kerosene, solubles, light and medium oils, etc., 4 to 100 g.p.m. Tank sizes, 6, 15, 30 gal. or larger, with as many hoses and nozzles as required. Discharge pipe is cast integral with pump and brought to outside

of tank. The hinged cover allows cleaning without disconnecting return line.

Brady Taviod

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M

REID All Electric Automatic Feed Surface Grinder No. 2B

Equipped with Motorized Spindle

A Proven
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VIMCOLIGHT



CARELESSNESS Often Traced to EYE FATIGUE

Carelessness . . errors . rejects . slowed-down production are often due to improper machine tool lighting! Many valuable man-hours can be saved by installing VIMCOLIGHTS. Adjustable quickly to any position — they spot-light the work with non-glare, point-of-operation illumination. Send for circular. Vimco Manufacturing Co., 109 Chenango Street, Buffalo 13, N. V.



This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36 ¼" band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW BOOKLET ON FINISHING—WRITE TODAY

WALLS SALES CORP. 96 Warren St., New York, N. Y.

PRESS WITH TRAVELING RAM

A new power press (designated HP-0167-P) with a traveling ram has been added to the line of presses made by Anderson Bros., Mfg. Co., Rockford, Ill.



This press is especially adaptable for straightening cam shafts. Instead of moving the anvils, centers, and work, the ram is moved along on ball bearings.

The base and hydraulic unit are the same as used on the Model HP-010-P. Operators like its sensitive control because a shaft can be bent and inched along a thousandth at a time.

This first unit has a capacity of 10 tons or 20,000 lbs. However, plans are being made for a 25 ton press. Automobile and airplane plants will be especially interested in this new type of press.

MOTOR MICA

ANTI-FRICTION COMPOUND SERVING INDUSTRY FOR 30 YEARS

Cools hot bearings Solves toughest lubricating problems, Saves wear on moving parts. Works wonders with cutting oils.

Packed in 5-10-25-50-100 lb. containers,
QUICK SHIPMENTS
Write — Wire — Phone your Order today!

SCIENTIFIC LUBRICANTS CO. 3469 N. Clark St. Est. 1914 Chicago, III.





The Compact Electric Furnace with Many Uses

This handy compact, portable unit is popular in shops and laboratories for heat-treating and many other jobs. Expertly designed and built, "it's a lot of furnace for a low cost." Write for details today.



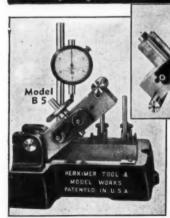
THERMO ELECTRIC MANUFACTURING CO.

486 W. Locust St.,

Dubuque, Iowa

Dimensions—Inside, 4" wide, 3\%" high, 3\%" deep; outside, 9" wide, 14" high, 10" deep.

Simplified BEVEL GEAR GAUGING



No Difficult Operations, Involved Calculations or Intricate Manipulations.

With one set-up on these tools, any operator with ordinary gauging experience and a knowledge of blue print reading, can perform these

three important operations:

- 1. Check dimensional accuracy of the addendum cone (gear face) as related to thrust face of hub.
- 2. Check accuracy of cone angle.
- Check run-out of gear face.
 Write for descriptive folder.

HERKIMER TOOL & MODEL WORKS, 1010 George St., Herkimer, N. Y.

SPEEDS DIE PRODUCTION



ONLY 90c Each

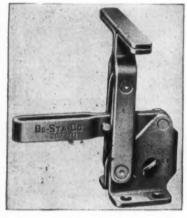
PROGRESSIVE & COMPOUND DIES

Modern Automatic Die Stops eliminate speilage. Cut mounting time te ½-heur. Need no installation skill. Hardened thruout. Try one. Or write for literature.

MODERN

Metal Specialty Co. 4419 Montrose Ave. CHICAGO

T-HANDLE CLAMP



A recent addition to the De-Sta-Co line is a small, light duty toggle clamp with a T-shaped handle. It is claimed this has

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MACHINES HELP YOU

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BIS Morrell St.

Elizabeth, N. J.

been found to increase efficiency of operation in spots where limitations of overhead space prohibit use of larger or taller clamps. In such places, the T-handle provides a firm grip which would be impossible with a shortened straight handle of standard type.

The clamp is available with either the straight solid work bar, Model No. 207-TS, or the now widely used U bar, Model 207-TU. In this latter model, the retaining bolt can be set at any desired distance from the handle, thereby making clamp adaptable to varied job requirements.

Dimensions are 3%" from end of work bar to end of base and 4" high overall when in locked position as illustrated.

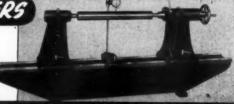
Full information will be sent on request, by Detroit Stamping Co., 347 Midland Ave., Detroit 3, Mich.

ATLAS COOLANT PUMPS

Coolant Pump Catalog No. C43 is offered by Atlas Press Co., 550 N. Pitcher St., Kalamazoo, 13D, Mich. It contains sketches and descriptions of applications to lathes, screw machines, cut-off machines, drill presses, and milling machines.

BENCH CENTERS

Removable Centers are tool steel, hardened and ground. Equipped with screw tailstock. Made in sizes to swing diameters of 12", 18", 21", 24", with base 36" and 48" between centers.



MICHIGAN DRILL HEAD CO.

771 E. 8 MILE ROAD

Announcing MEAD

AIR COLLET

These new high production precision fixtures open up new vistas in the field of second operation work. Their accuracy will meet the most rigid requirements; their fast action leaves nothing to be desired; their compactness does not waste a fractional inch. They will hold a l" bar so firmly that a strong man cannot turn it with a 12" pipe wrench, yet in conjunction with a suitable pressure reducer they will gently handle the most delicate of precision parts as low as 1/16" in diameter. Automatic ejection of finished work.

Write for new Mead Air Power Catalog.

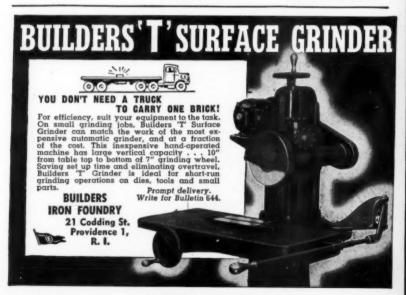


MEAD SPECIALTIES COMPANY

15 South Market Street

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CHICAGO 6, U.S.A.





for flat surfaces, straddle milling, slot cutting, etc. They have been used successfully in gear cutting and hobbing.

• Fly Cutting

SlottingFlat

Surfaces
• Straddle

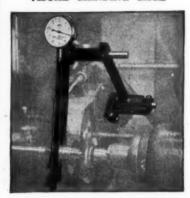
Milling
Gear
Cutting

Any type of bit can be inserted and adjusted quickly. Complicated cuts are broken down into simple units by grinding each bit for a portion of the job. The Newfield fits all standard arbors, turns to any required speed, and is made in 4, 6, 8, 10 and 12" sizes. The 10" size provides 6 tool positions.

Wzite for complete details.

MACHINE PARTS CO.

VISUAL GRINDING GAGE



The Stuart Micromatic visual grinding gage is announced as a contribution to accuracy in precision grinding operations while materially increasing speed of such work.

Gage is applied to and taken off work while machine is in operation. Hand "miking" is eliminated. Dial indicator guides operator as work is ground to size. Gage indicates correct size even tho sizing controls of machine may be worn.

Operator fatigue is said to be greatly reduced, rejections and waste avoided; grinding tolerances of plus or minus .0001" easily maintained.

In construction the gage has no gears, levers or angles. Dial is actuated by direct parallel thrust. Contact points of caliper measuring bar are of tungsten carbide for long wear. Made in two models, gage has ranges of ½" to 1½" and 5%" to 2½" respectively. Additional calipers for larger model provide ranges of 2" to 5" and 5" to 8" respectively.

This gage is distributed by Clawson & Bals, Inc., 4701 W. Lake St., Chicago, Ill.

BEG YOUR PARDON!

In the April issue we carried an excellent story on Qualifications of Arr Welding Operators, by Arthur Madson. In the next to the last paragraph on page 204, is a discrepancy. It was the author's intention to mention the U. S. War Department, Washington, D. C., but in some manner "War" was deleted. Our apologies to the readers and Mr. Madson,

Air Regulating Valve

new...inexpensive



These new combination regulators and valves are equipped with a special compound spring, which provides sensitive and instantaneous adjustment for all secondary pressures from 1 to 150 lbs. Send for bulletin No. 83-B—Dayton Rogers Manufacturing Co., 2847 12th Avenue South, Minneapolis 7, Minnesota.



STERLING DRILL GRINDER



5" x 9" adjustable table.

MOTOR: 1/2 hp. 3450 rpm.

NET WT: 250 lbs.

CRATED: 320 lbs.

PRICE: \$150.00.

McDONOUGH MANUFACTURING CO. EAU CLAIRE, WISCONSIN, U. S. A.



SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs.

swivels and locks in any position. Can be varied 151/2" by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

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The Originators of the

PRECISION WORK IN MANUFACTURING

65 Standard Styles and Sizes. Manually operated presses 1/4 to 35 tons pressure. Motor driven hydraulic presses 11/2 to 30 tons pressure.

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NEW HAMPSHI



Portrait of Precision

Thousands of Haines Special Gages are accelerating output in ordnance and aircraft plants throughout the country. • Representative Haines gages as well as the men and machines which produce them, are shown in a bulletin just off press. A copy will be sent on request. Haines Gauge Company, 2301 W. Allegheny Ave., Philadelphia 32, Penna.



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OPEN END PILING BOXES



NOW AVAILABLE FOR PRODUCTION USE

These boxes can now be furnished to Defense Plants for handling of parts in production and assembly, when used as portable containers.

THE CLEVELAND WIRE SPRING CO., 5250 Brookpark Road, CLEVELAND, OHIO
SHEET METAL DIVISION

ARMOR COLLET CHUCK



Manufacturers of Armor Milling Machines, Aircraft Machinery Corp., 214 W. Orange Dr., Burbank, Cal., are now shipping Armor Collet Chucks for small production lathes. A large number of experimental models were placed in selected shops for some 10 months before proceeding with quantity production, it is stated.

A feature of the Chuck is the Wedge-Lock which is guaranteed to prevent slippage whether chuck is working on soft aluminum or hard alloy steel; and to hold material several thousandths over or under size. Stock is forced against stop and securely held there by a combination draw-back and push-out action which insures accurate stock length. No heat is generated or power consumed by the Chuck since it revolves with spindle and requires no bearings or lubrication. Full spindle capacity is provided; and Collets are available in round, square and hexagon types. Adapters can also be furnished on order to accommodate most collets.

GAUGE MASTER

A new all-purpose Gauge Master for making depth and inside micrometer measurements with an ordinary micrometer caliper has been perfected by L. H. Harvey Associates, 254 First Ave. N., Minneapolis, Minn. eliminating need for a depth micrometer in most precision work.

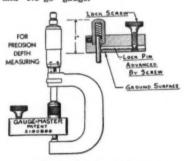
It consists of a hardened steel block, ½" wide, ½" high and 2" long, near one end of which is mounted a hollow head containing a coil spring. This spring actuates a measuring pin extending thru the ground under-surface of block and held in position by a horizontal pin controlled by a thumb lock screw.

In operation, measuring pin is forced down by spring until it seats itself. Then it is secured by lock screw and reading is taken with a micrometer caliper, from top of head to tip of measuring pin.

When measuring pin is locked flush against ground surface, release of a lock screw permits spring to force head upward for instantaneous setting to micrometer. For use with a 2" mike, head is set 1" above ground surface and depths to 1" can be measured with two interchangeable pins supplied with gauge. For a 1" mike, head is set 4" up and depths to ½" can be measured.

Measuring pins are standard 5-32" drill rod; longer pins can be made by user. Readings can be taken with an ordinary scale if micrometer precision is not required.

The Gauge Master can also be set to a micrometer reading and used as a "Go" and "No go" gauge.



ONSRUD ISSUES CATALOG

A very attractive new 48-page, pocket size catalog has been issued by Onsrud Machine Works, Inc., 3908 Palmer St., Chicago (47), Ill. Its purpose is to give the reader a complete picture and description of all the different types of equipment offered by Onsrud.

It's believed that presentation of all the Onsrud high speed machines in a single catalog will permit a preliminary analysis of production problems in terms of the equipment available to do the jobs,



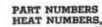
Whichever you want, a straight cut or irregular curve—it's as easy on the inside as the outside, on either flat sheets or formed work. No starting holes needed for an inside cut. A Libert is easy to operate—foot pedal control allows use of both hands to guide work at all times. It shears cleanly! Edges are smooth; need no further finishing. Write for Bulletin.

Made in sizes up to 60-in, throat, 10-gauge capacity

LIBERT MACHINE COMPANY, Green Bay, Wisconsin



MARK YOUR PARTS Permanently



CATALOG NUMBERS. SERIAL NUMBERS.

PATENT NUMBERS

MANUFACTURER-INSTRUCTION DATA-INSPECTION

Positive, Permanent marking on your products assist prospects to order. Makes it easier to buy—new, repeats and repairs. Gives you a definite record of pertinent data on each part produced.

The Pneumatic marking machine illustrated is our HI-DUTY model 25 general purpose tool for short runs or production work. It operates from your shop air line and is one of numerous models built to produce neat, permanent markings quickly on metal fabrications.

We will be happy to make specific recommendations upon receipt of samples or prints of parts to be marked, showing approximate lattering, its location on the part, with required hourly production.

MARKED PARTS ADVERTISE

IN THE RIGHT PLACE, AT THE RIGHT TIME.

Send for complete catalog of our full line of marking Tools, Machinery and Equipment.

1802 Belle Plaine Ave..

Chicago, III.

MODEL 25

A NEW HAMMOND GRINDER

A new heavy duty chip breaker and diamond finishing grinder is announced by Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo 54, Mich.

It is built to meet the heavy duty requirements of production plants handling large volumes of carbide tools.

Known as Model CB-76, it is designed for accurately grinding chip breaker grooves, and for precision finishing of all single point carbide tipped tools requiring smooth, sharp cutting edges. It features a newly designed any-angle-vise (standard equipment) that will handle all types of box and single point tools up to 2" (and larger if required). Vise has universal adjustments and dials are of direct-reading type which facilitates calibrating of correct grinding angles.

Diamond finishing grinding side (left) is designed for 6 or 7" diameter cup wheels. Tilting table assembly is moved by screw adjustment. Generous table-well clearance permits wheel changes without necessity of removing table assembly.

Ball bearing, V-belt driven spindle provides vibrationless grinding. Spindle, it is claimed, is not only of precision type, but it also is considerably heavier than



is normally used for the size wheels mounted. Grinder is powered by a ½ hp motor. Coolant tank holds 1½ gallons.



Presenting A SUPER DIAMOND WHEEL

CUTS MUCH FASTER — LASTS MUCH LONGER

Diamond Tools & Wheels
To Your Specifications
SEND US YOUR PROBLEMS



Free Engineering Service

DIAMOND WHEEL INDUSTRIES, INC. 57 E. JACKSON BLVD. CHICAGO 4. ILL.



FEBRUARY TOOL PRODUCTION

According to WPB the value of machine tool shipments during February totaled \$50,150,000, a decrease of 11 per cent from the \$56,349,000 shipments in January. The figures are based on reports from 281 companies in the industry, plus estimates for 66 companies whose reports for February have not yet been received.

Machine tool shipments have shown almost steady monthly declines since December, 1942, when they totaled \$131,960,-

The total of orders received by firms during February, 1944, amounted to \$33,-512,000, an increase of more than 12½ per cent from the January total of \$29,-736,000. Cancellations declined more than 7 per cent during February, to \$2.057,000. January cancellations were \$3.280,000.

Unfilled orders remaining on the books at the end of February declined 10.4 per cent to \$162,667,000, as compared with the backlog of \$181,548,000 at the end of Janu-

The preliminary report of the Tools Division for February covers the 347 machine tool builders reporting to WPB. The report applies only to non-portable pow-

er-operated tools (with a valuation of \$350 or more each) used to shape metal products, progressively removing metal by such methods as drilling, grinding, boring, milling and planning. Metal forming machines, such as presses, forging hammers, extruding machines and shears, are not included in the report.

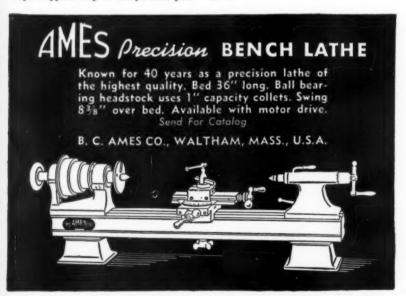
POST-WAR PLANNING

Designed to help untangle the many conflicting statements concerning our post-war economy, 286 of the most vital peacetime plans and projects now underway in American industry have just been summarized in "Post-War Planning Now".

Now".

The actual peacetime outlook in 56 major industries; descriptive details of new products, services and processes; and the formula for a gradual lifting of price, priority and ration controls are thus compiled for the first time under one cover.

All the material for this second edition of "Post-War Planning Now" was obtained from data furnished by key industrialists, government and trade association officials. Copies may be had at 25 cents each from the N. Y. Journal of Commerce, 63 Park Row, New York 15, N. Y.



Aber CURVED TOOTH Milling Cutters

with "Chatterless Flowing Action"



PATENTED

- HIGHER SPEED (R.P.M.)
- LONGER CUTTING SURFACE
- LONGER LIFE

TYPES

PLAIN MILLS
STAGGERED TOOTH SIDE MILLS
OVERLAPPING SIDE MILLS
R & L HAND SHEAR SIDE MILLS
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WOODRUFF KEYWAY CUTTERS
CUTTER UP TO 14" DIAMETER

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ABER ENGINEERING WORKS, INC., Waterford, Wis.

SAVE TIME ON INTRICATE ANGULAR SET-UPS . . .

MULTI-SWIVEL VISE



Fully universal . . . three swivels simplify the setting of compound angles. Parts interchangeable . . . can be used as a plain flanged vise, a swivel vise or multi-swivel vise.

The Platen greatly increases the capacity of the unit. Vise and Platen are interchangeable.

WRITE FOR INFORMATION

MASTER TOOL CO.











BWAYS TO SAVE TIME

8 MONEY with the MEAD

Industrial Burring Machine

New circular explains, illustrates 18 ways in which the Mead Industrial Burring Machine saves time and money — also contains special Grit Guide. Every industrial plant needs this "fack-Of-All-Trades" machine. Your burring can be

done in "free time"—install these machines by every machine tool which I e a ve s burrs. Grinds, finishes both outside and inside cutout openings. Immediate delivery in most cases. Write for the informative Money-Savina circular now.

MEAD Specialties Co.

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For METAL - PLASTIC - WOOD

RIGHT DIAMOND TOOL!!!

Takes the **HEADACHE** out of the toughest wheel dressing job. DESSAU DIAMOND TOOLS are right! Every diamond must pass the most rigid tests for hardness, shape and construction before it is set into your specific type of tool.



Write Dept. M.T. for newest catalogs and price lists.

Single Stone Dressing Tools • Multiple Point Diamond Tools • Shaped Diamond Tools • Phonopoints for Fine Radius Dressing • Thread Grinding Tools • Hardness Tester • Diamond Powder



MAURICE S. DESSAU CO.

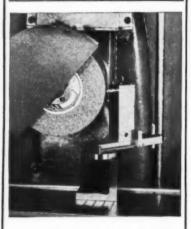
Industrial Diamond Importers

Diamond Tool Manufactu

535 FIFTH AVE. . THE TOTAL NEW YORK, N. Y.

Dessau Diamonas True the Wheels of Industry

The FORM-MASTER ANGLE AND RADIUS DRESSER



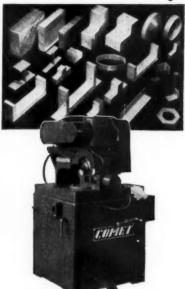
An all-purpose angle and radius dresser for high-precision at low cost. Accurate easily within .001". Simple to operate. Dresses in horizontal position enabling operator to SEE the form in work. All parts hardened and ground (except cast-iron base which can be drilled and tapped). Suitable for surface and cylindrical grinders. Two 1/3 ct. diamonds and instrument case included. \$150.00 complete.

It readily produces: Any desired angle; Convex radii to 4"; Concave Radii to 7". On 7" wheel.

Specifications: Base 3"x3", height 8½"; Wheel capacity 10"; Angular travel 3".

For information or a demonstration CALL YOUR SUPPLIER.

J. & S. TOOL CO. 477 Main St., East Orange 2, N. J.
PRECISION DRESSING TOOLS



CUTS METAL FASTER More Accurately

If you require accurate, high-speed cutting of non-ferrous metals and other materials, here is your machine. Cuts by smooth, fast, milling action. Pneumatic hydraulic feed is coordinated with speed of cutting blade. Vise synchronized with action of ram. No vibration because of weight distribution. Has 4 speed transmission and variable feed mechanism. Built-in coolant system. Properly operated, blade breakage is eliminated. Write or wire for free literature.

CONSOLIDATED MACHINERY & SUPPLY CO., LTD. 2031 SANTA FE AVE., LOS ANGELES, 21, CALIF.

COMET
AUTOMATIC CUT-OFF MACHINE
MODEL MH

AUTOMATIC STAKING MACHINE INCREASES PRODUCTION With Unskilled Manpower!



Outperforms conventional Riveters on numerous jobs.

A shortage of skilled workers won't upset your staking machine production if you use the Automatic Staking Machine which, even in unskilled hands, is fast, accurate and thoroughly dependable.

Uniform blow of hammer makes it ideal for riveting movable joints; can be quickly and easily adjusted for various jobs.

Available in Three Sizes

		1	1-B	2
Stroke	***************************************	2"	2"	21/2"
Spindle	Depth	1"	1"	11/4"
Throat	Depth	43/4"	43/4"	81/2"

Now's the Time to Write for Descriptive Material and Prices.

WEBER MACHINE CORP.

59 Rutter Street

Rochester 6, New York

BALDOR BALL BEARING GRINDERS

A Complete Line

for every grinding job



AT LEFT: Special Carbide Tool Grinder for quickly and accurately sharpening Carbide Tools. 1/2 HP ball-bearing Motor.

6" x 1" wheels. \$95.00

AT RIGHT: Baldor Pedestal Grinder No. 121; 2 HP motor; 12"x2" wheels

ASK FOR BULLETINS

BALDOR ELECTRIC COMPANY

4368 Duncan Ave., St. Louis 10, Mo.





Babbitrite Prevents Injury From Molten Metal

- Babbitrite contains no moisture, does not generate steam when in contact with hot molten metal.
- Babbitrite's strength of body gives it greater capacity to hold a charge of hot molten metal.
- Babbitrite adheres tightly to the mold or metal, under all working conditions.
- Babbitrite does not melt and allow Babbitt metal to run out, regardless of pouring temperature.
- Babbitrite does not dry out or harden, yet remains moisture-free.
- Babbitrite is ready-for-use, requires no mixing, may be re-used over 100 times.

Babbitrite

Write for Liberal Sample.

PRODUCTS MFG. CO. 509 E. BUFFALO STREET MILWAUKEE 2, WIS.

SNAGGING

The type of grinder used for snagging castings will depend in every case on size of the work being handled. Small parts or castings that can be manually handled without a great deal of fatigue are usually taken to heavy floor grinders designed for such service. In many cases, castings too large to handle in this way, without tiring the operator greatly, are cleaned up with portable air-powered grinders that carry wheels from 4 to 8" in diameter.

However, for heavy snagging work on large castings, and where there is much of it to be done continually, a swingframe machine is the usual choice. In any case, the wheels that a r e used for snagging service are very important.

Manufacturers of grinding wheels have given special attention to the production of wheels particularly adapted for this duty.

With regard to heavy floor grinders that have been designed for foundry snagging, some have provided machines with pedestals having central mounting points for the motors, so the grinding wheels can be mounted on arbors at both ends of long, extended motor shafts. These machines will stand much hard work and even abuse, day-in and dayout. The shafts are supported in very large and competent bearings adjacent to the grinding wheels.

However, some builders of heavy snagging grinders

supply machines that could carry largediameter wheels. In order to make this feasible, it is necessary that some means of compensating for the reducing diameter of the wheels be provided, for the surface speeds of the wheels reduce with the shrinking diameter. To maintain their maximum efficiency, the grinding wheels must be kept at a surface speed of 8,000 to 9,500' per minute.

To do this, one manufacturer has enclosed the motor in a hood at the rear of the machine, and provided a three-speed V-belt drive. Thus, the full sized wheels are first driven at the lower rpm.

MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S.

NAVAL AIRCRAFT FACTORIES

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(Die Making Machine)

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NIBBLING MACHINES

Many advances have been made in nibbling machine practice since these machines were first introduced, and models for different kinds of work have been perfected by a number of manufacturers.

One of the more recent nibblers is of a portable type, and is quite small, being readily held and guided by one hand.

This little tool has revolutionized the cutting of irregular shapes in sheet metal. It has a capacity that will permit cutting of steel sheet up to 18-gage, and softer metals, such as aluminum, can be cut up to 15-gage. It is far more versatile than a

portable shear, in that it will permit cutting of circles as small as 1" in diameter. It is made as small as 1½" in diameter can also be handled. The tool will follow along on the curved surfaces of tubing without trouble.

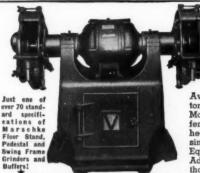
Some nibbling machines are stationary tools, and are set on a ped-estal to bring them to a comfortable working height. One firm makes these machines in sizes to handle stock up to %" thick. This covers a wide scope, and the machine has been found especially advantageous for cutting out contours, whether in-ternal or external. that have in many cases in the past been made by drilling a series of holes, when it was an internal job.

Sheet steel, chrome-nickel alloys, and many different composition materials such as celluloid and Bakelite are readily and quickly shaped. Irregular templates and cams fall within its scene for

in its scope, for there are many screw machine cams that are made of material %" thick or thinner.

Aircraft factories find many uses for modern nibbling machines, especially since some of the stationary nibblers are so fully adaptable for cutting tubing. There is one turret head nibbler which is used in aircraft and shipbuilding activities for the cutting of tubing and parts. It is also used in sheet metal and plate shops.

There are some shops which have only an occasional nibbling job to be done, which hardly justifies the installation of a nibbler; they use a combination tool.



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COLLETS

Whether collets are being used for holding work, or for holding tool shanks, they are always an important part of the mechanism in which they are used. Collet chucks of different kinds present an interesting study. Floating tool holders of various types are made which incorporate quick-change collets.

As made by one firm, such toolholders may be obtained with parallel float only, or they may be had in universal type which provide both parallel and angular float. The same firm makes a line of positive drive and vertical float drilling and tapping chucks that are equipped with collets.

Collet chucks for holding various sizes of drills in the turrets of automatic screw machines are available, which incorporate a precision eccentric adjustment for faster centering of the turret with the spindle. Drills all the way from No. 80 to ½" diameter can be held in this type of collet chuck. The drill can be set to any required length, for the collet grips on the flutes of a drill as well as on the shank. The collet collapses 1/32", so a full purchase will be obtained on the

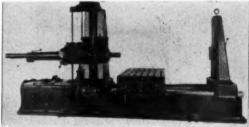
Collets for use in lathes and in milling machines are a different proposition. So me firms make a specialty of this particular kind of collet, and keep a large stock on hand in all of the regularly required sizes, so that orders can be filled promptly. These draw-in collets should be handled with particular care

in the shop, to protect the external threading, which they incorporate, from being bruised or damaged.

Quick-change chuck and collet outfits for use at the drill press show remarkable results on jobs of types which involve a great many operations. As made by some firms, such outfits enable the operator to change tools without stopping the spindle, and the collets that are used, hold the tools centered and rigid. Friction-drive tapping collets made by one firm allow the performing of tapping operations without danger of tap breakage, at drilling speed.

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GRINDING ATTACHMENTS

There are two different classes of grinding attachments in general. One is a small machine or attachment, as the case may be, which carries the grinding element directly, designed to be used with some standard machine.

The other type is a device for attaching used for holding a specific type of work for some certain type of grinding. Either class of attachment often proves to be exactly what is needed in certain shops, where it happens to fit properly into the working schedule.

Some attachments a re designed for specific kinds of tool sharpening. A case in point is a power hacks a w blade grinding fixture, which makes it easy to keep hacksaw blades at maximum efficiency, effecting a great saving in cost of hacksaw blades, also

Grinding attach-ments that carry a small-radius grinding wheel, and can be used in connection with most surface grinders, en-able the man who is working on tools. dies and gages to get into slots, recesses, corners, etc., which are impossible to reach with a larger wheel. Yet these tools incorporate the high de-gree of accuracy that is obtained in most surface grinder work.

Such attachments are made by one firm, both in horizontal and vertical spindle form, and the spindle form, and the spindle on the spindle on the spindle on the spindle of the spindle so these attachments.

incidentally, are preloaded by ingenious spring attachments, so there can be no troublesome endplay.

A different type of attachment which is applicable to the surface grinder has been developed. It is in the form of a bracket, which will fit any surface grinder with a 3 or 3½" diameter spindle housing. The device is so made that it permits operator to swing the small grinding wheel which it carries, to any desired angle. It may be used in models ranging from ½ to 1 hp., incorporating spindle speeds from 7,500 to 50,000 rpm. Thus, the portable grinders solve many problems.



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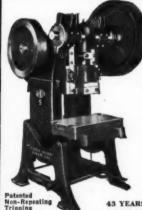
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GRINDING AND LAPPING OILS

While many different kinds of coolants are used in various grinding operations, one that is perfect has not been found. There are functions other than cooling, tho, that are admittedly important.

Soda solutions, soap solutions, water and other coolants, as well as soluble oils, all have their advantages and disadvan-

tages.

One of the big things in favor of soluble oils is that they offer a coolant that will not rust either the work or the grinding machine. Another is that they are a distinct aid in the production of a good finish on the work. These advantages are sufficient to make them the favored selection of many production men.

Soluble oils, of course, in addition to being used for grinding, are provided for the cutting, drilling and drawing of metals. In fact, there are soluble oil spe-cialists that have them for applicaoperations, and on all kinds of metals. They are quite ready to go into specific produc-tion problems where the selec-tion of the best oil is the object.

The use of an oil that has been especially engi-neered for grinding has proved very important in some instances. In cases where proper coolant is not used, work spoilage may run high. Frequent dressing of the wheels may be necessary, not only slowing down the work by transforming production time into wheel dressing

time, but taking a toll in the matter of wheel economy. Such troubles, are avoided by use of a certain oil that has been developed for grinding, and for no other purpose.

One of the drawbacks in the past, to the use of oil in grinding, has been the fact that it did not have sufficient detergent effect on the face of the wheel. It is a fact that if just any old oil be used, it may be found that it even builds up a gummy deposit on the face of the wheel.

Yet, there is a grinding oil that has been used in the grinding of threads, worms, gears, which reduces grit size.



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BEVERLY HILLS, CALIFORNIA

POST-WAR PATENTS

Strong patent protection will be vital to postwar jobs and the creation of new small businesses, R. J. Dearborn, president of the Texaco Development Corp., said recently upon accepting chairmanship of the committee on patents of the N.A.M.

"If America is to have enough jobs after the war we must encourage invention in small business," declared Mr. Dearborn. "Invention and small business depend on patents.

"Patents protect the little fellow from having his ideas pirated. They are the sling shots that make it possible for the little Davids to compete with big Goliaths.

"They give new businesses a chance to get started. This creates jobs and gives us the technical progress that leads to more goods at lower prices for more people."

"Many Americans do not understand that at patents stimulate competition," said Mr. De arborn. "Every new idea disclosed in a patent adds to our fund of knowledge. Every invention spurs competitors to find a better one.

"About 85% of all patents are granted to independent inventors or are assigned to small manufacturers. Patent protection is important to large companies but it is vital to small ones."

Patents give inventors property rights in inventions and it is a mistake to associate this with oppressive monopolies. "Ownership of a patent is exactly the same as ownership of a house or automobile, except that the patent expires and becomes public property in 17 years".

The NAM committee on patents has developed a series of 11 recommendations for improvement in the U. S. patent system. Many recommendations pertain to simplification of procedure within the patent office to prevent unnecessary delay and expense, he said, "in the interest of the little fellow."

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NUMBERING MACHINES

Numbering heads or machines are used for marking a great many different kinds of materials, tho there is little question that their uses are as great in the metalworking field as anywhere.

Another of the outstanding uses for numbering machines is in connection with the printing press, where it is desired to number each impression consecutively as it is made. There are firms which specialize in the manufacture of printing press numbering machines, and in addition rent and repair them. The rental feature is convenient for printers who seldom have occasion to use numbering machines.

For use in metal-working indusries and similar work, there are numbering machines of different kinds. Some are for use by hand, and provided with simple shanks that can be struck with a hammer for making the number impression. Others are furnished with round shanks to make them applicable to power presses, and a great deal of numbering is done by means of such machines in the press.

Then, there are special numbering machines designed to set on a bench which have means incorporated for providing their own pres-sure. One of these carries both numbers and letters around the outer edge of a disc. The lettering and numbering dies on this little machine are replaceable.

Such machines are to be had in a range of sizes, carrying dies from 1/32 to %". They are frequently used for the marking of parts, nameplates, castings, etc., and can be used for making nameplates from stainless steel, sheet iron, brass or aluminum.

One numbering machine has been especially designed for the stamping of serial numbers into nameplates. The firm making it also provides numbering machines that operate on the rolling principle. When numbers and other markings are rolled in, much less applied pressure is necessary, since only a small part of the impression is being made at any one time.

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Special consideration for small business during the postwar reconversion period, and a far-reaching program of national and local assistance to small-scale enterprise thereafter, are proposed in a statement issued in bulletin form by the Committee on the Special Problems of Small Business of the Committee for Economic Development, 285 Madison Ave., New York (17) N. Y.

The statement urges that "the opportunity to start a new business and the health of existing small businesses are essential to a dynamic and virile economy after the war and to the preservation of

our free society." Asserting that small, independent business is both symbol and core of the spirit of individual enterprise, the statement recommends consideration of measures to "remove obsta-cles which impede the establishment of new business." and to "afford positive aid in the reduction or elimination of differential handicaps from which small business often suffers."

Altho recognizing that the problems of small business "do not lend themselves to quick and ingenious answers' and cannot be solved "merely by the enactment of remedial or punitive legislation", the statement urges a number of specific measures, both national and local, to favor "the organization and growth of small, independent enterprises essential to the preservation of a free society after the war Among the national measures urged are:

1—Special consideration to small

business in termination of war contracts and disposal of government-owned plant and surpluses, and fair treatment in postwar allocation of materials to help small business resume peacetime independent operations:

2—Recommendation that smaller firms able to convert to peacetime production more rapidly than large establishments be not required to wait until the latter are ready for production:

3—Constructive recommendations for local aid in financing postwar small business;

4—Exploration of possible provision for adequate tax relief for small business-



be used on metal and plated surfaces without any damage to the material. Extra tips are immediately replaceable by hand because they are threaded.

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HAND SCREW MACHINES

Some think of the hand screw machine chiefly as being adapted for the plant having only a moderate number of screw machine parts to produce, and, therefore, chiefly as an adjunct to the lathes in the shop. However, it is just as valuable in automatic screw machine departments, for drawing off the smaller jobs from high-priced automatic screw machines, reducing setup time and increasing actual running time on the latter.

Some hand screw machines can also be used as chucking machines. These have a collet capacity of 1" and a chucking cap-

acity of 6". An indexing turret head is incorporated that will take standard B & S turret tools. A cross slide is fitted to the machine that will accommodate circular form tools of 134" and 234" diameter.

Some hand screw machines have a surprising speed range for the spindle. One machine of this kind, fitted with preloaded ball bearing spindle mounting, has 12 different spindle speeds, ranging from 30 to 1450 rpm. The diametral capacity of this little machine is 5%", and it has an automatic indexing turret with six tool positions.

An accessory in the nature of a special bar feed is obtainable. The feed has a maximum stroke of 2". More than this is seldom required.

One manufacturer of pipe

and bolt threading machines has also developed a low-cost hand-operated screw machine which has been found useful in connection with war production work. There is a certain amount of mechanical relationship between threading machines for pipe and bolts, and hand screw machines, and as a result, the addition of a hand screw machine is well worth while.

Speed variation of stepless type on the spindle, while the motor of a hand screw machine is running, is something of an innovation in this field. It is found on a small machine, actuated by a handwheel,

ferent machines. Ideally adapted for

slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

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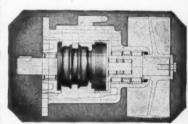
This example shows the clutch unit bolted directly onto the machine. The input pulley runs continuously. This single type PULLMORE application, with multiple disc brake, is but one of hundreds of ways that PULLMORE CLUTCHES are benefiting new and improved machines.

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MAGNESIUM ASSOCIATION

To assure the future of magnesium alloys and to foster development of fabrication techniques industry members (producers and fabricators) have formed "The Magnesium Ass'n." Temporary offices are at 2537 W. Taylor St., Chicago 12, Ill. One of the purposes will be to give members and the public authentic information as to the properties and advantages of Magnesium alloys, as well as to the suitable types of applications.

The increase in production of magnesium metal in this country is one of the outstanding achievements of industrial and governmental cooperation during the war. Output has been increased more than one hundredfold in five years and now stands at an annual volume approximating 500,000,000 lbs.

Magnesium metal is no longer that of in terms of incendiary bombs, other pyrotechnic applications. Among other uses of magnesium alloys, one of the largest is for integral parts of airplane construction. Many hundred different sizes and types of magnesium alloy castings are used in airplane engines, airframes and other applications such as landing wheels, brackets and miscellaneous parts.

Outstanding uses of magnesium alloys in the future will be for applications where ease of machining is important or where elight weight can increase portability of equipment or permit increased pay loads of transportation facilities. A few such applica-

A few such applica tions include these important uses:—

Portable Tools, Truck Parts, Railroad car parts, Radio Parts, Conveyors, Wheels, Office Equipment, Dockboard, Exhaust fans, Household appliances, Pulleys, Aircraft and automotive engines, Sewing machines, Portable equipment, Printing frames, Spools, Textile machinery. Artificial limbs, Foundry flasks and core boxes.

There are today in excess of 100 companies engaged in the fabrication of Magnesium and its alloys, taking the form of drawing, forging, rolling, extruding, sand casting, permanent mold and die casting and powder manufacture.

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NUT RUNNERS

The extent to which nut runners are replacing ordinary wrenches is notable. This is largely due to the high degree of standardization that is being practiced thruout industry at present. Of course, the nut runner has always been a highly valuable aid to fast assembly, in cases where a great many nuts of one size are to be tightened.

In general, it might be said that most manufacturers making good lines of portable electric or portable pneumatic tools will offer some kind of nut runner. Some of these are very husky tools, and are

end of his normal working day. Given a nut runner with an adjustable-

torque clutch of the type mentioned, the human element in this respect is automatically removed.

One firm producing a line of efficient pneumatic tools has a model known as a multiple-angle tool. It can be adjusted to work in all 360 degrees of the circle, and can be fitted out to operate as a nut runner.

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lines.

There are some nut runners of quite small, pistol-grip style, which are highly efficient for turning up the smaller sizes of nuts. One tool of this kind is fitted with a special clutch, which has means for selecting and adjusting to the exact torque required. By this means, it is possible to turn up all small nuts to a given degree of tightness, just as it is done with a torque wrench on larger nuts.

It is a fact beyond controversy that as fatigue grows on a man, he will tighten nuts a little less and less, so that there may be considerable variation between the start and the

In nut runners used on larger bolts and nuts, the same kind of device, in the form of a shockless clutch, may be used to protect operator from the continual recurrence of shock as the nuts come up. Some builders make nut runners in such a full line that they get into large sizes, as for instance, one firm making a pneumatic runner in sizes from 3/16" all the way up to 2".

SAVES TIME

IN YOUR STOCK ROOM



The BROWN SECTIONAL RACK saves the time wasted and-hauling stock from the old-style, closed-side rack and quickens the selection of sizes by greater visibility. Built of standard metal sections: can be expanded for changes in stock or growth of business. Made in 5 styles: can't burn, depreciation practically nil.

SEND FOR BULLETIN 26-B

BROWN
ENGINEERING CO. READING PA



Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,-000 stock sizes and 46 different styles. A die set that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

E. A. BAUMBACH MFG. CO. 1810 So. Kilbourne Ave., CHICAGO, ILL

Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for per-

1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

fect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight



We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.

J. C. BUSCH COMPANY ENGINEERS AND MACHINISTS
SINCE 1907
MILWAUKEE4.WIS.



MONTHLY FEATURES

- * Welding Metallurgy
- * Cost Analysis
- Welding Design
- Production Ideas
- * Salvaging Tools'
- * New Maintenance Economies
- * Useful Tricks and Tools

WRITE TODAY DEP'T B-5

. Created to disseminate factual information gained from the experience of successful users of EUTECTIC Low Temperature Welding, the new process which is gaining wide acceptance in production, salvage and maintenance on all metals from aluminum to zinc die-castings. Applicable with oxyacetylene metallic-arc, induction and furnace heating.

The EUTECTIC WELDER is prepared by the engineering staff of Eutectic Welding Alloys Company, and supplemented by contribu-tions from users of the process in all fields. Welders, welding engineers, and metal-lurgists have acclaimed The EUTECTIC WELDER. An engineer writes: "Found your publication a real boon to our welding department. Please add the

following names to your list and make sure to send us current issues every month."

FUTECTIC LOW TEMPERATURE' WELDING *Reg. U. S. Pat. Off.

EUTECTIC WELDING ALLOYS COMPANY 43 Worth St., N. Y. Originators of the Low Temperature Welding Process

PORTABLE GRINDERS

In considering the portable grinder field. one is strongly impressed with the range of grinding covered by portable machines. Ranging all the way from portable grinders used in the foundry for snagging duty, some of which carry grinding wheels as large as 8" in diameter, down to little grinders used by die and tool makers, which can be comfortably held and guided by one hand, such machines have revolutionized many plant operations.

In the foundry, some prefer pneumatic and some electric models. Both are quite readily available. Portable electric grinders of the snagging and cleanup type,

as made by one firm have a very high sustained speed, which allows full benefit of grinding wheels used.

In one foundry, they were claimed to have increased the life of grinding wheels more than 33-1/3%.

We are accustomed to seeing little grinding cones used in mounted wheel form on very small grinders, but did you know that the idea of the grinding cone has been extended to snagging and cleanup grinding? One manufacturer of pneumatic grinders can furnish such cones for getting into tight corners in snagging. Some of these grinding elements are roughly as large as a man's fist. They are provided. as are portable grinders sold by this firm, in sizes and types to reach all difficult spots.

As sizes of portable grinders and sizes of the grinding elements they carry decrease. their rotative speed must increase, in

order to keep a practical surface speed on the grinding elements.

One hand grinder with a bakelite body, and weighing just 3 lbs. delivers 18,000 rpm, of the spindle, which is mounted in ball bearings. This speed is practical for use with rotary files, consequently the unit is used with both grinding wheels of various types and with rotary files. It plugs into any convenient light socket.

There are models which are much lighter, and have far greater speeds. One of these weighs only 13 ounces, can be held in one hand readily, and has a spindle speed of 27,000 rpm. The motor armature is dynamically balanced.

T. H. L. FRONT LEVER BENCH PUNCH

Built for hard, tough work-die can-PRICE WITH ONE DIE ...

\$50.00 Immediate Shipment.

not lose alignment with punch - all parts interchangeable.

Capacity -1/2" holes through 3/16" steel: 13/32" through 1/4" steel. Can also be made for holes up to 7/8" in thinner metal. Stock punches and dies available from 1/16" to 1/2" by 64ths. Weight, 70 lbs.

T. H. Lewthwaite Machine Co.

(Est. 1890) 311 E. 47th St., NEW YORK IT, N.Y.

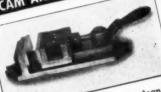
LUMA Combination Etchtool --3-Tools in 1 Luma Marking and Demagnetizing SIMULTANEOUSLY

Writes on hardened steel - demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

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CAM VISE Quick acting, clean, rugged in design. Drop forged can parts; hardened alloy steel screw paris; naraenea anoy steet screw and handle Precision built for rapid and nangle, Frecision punt for rapid production work on milling machines. production work on mining machines. Hardened and ground jaws. Semisteel castings throughout. Square key steet casungs inrougnout, aque slots in base at right angles.

Modern To BERLIN, CONNECTICUT

RUGGED QUICK IN ACTION



Swivel Vise For Milling Machine, shaper and drill press work. Base graduated in degrees. Precision built. Can be used without base. Hardened alloy steel screw. Hardened ened anny steel screw. nardened and ground jaws. Semi-steel castings and ground, laws, again-stars customys throughout. Square key slots in base at right angles. Write for circular.

SIGOURNEY M-100

STRENGTH ACCURACY RIGIDITY

drills down to .008" diam.

Sigourney M-100 Drilling Machines have the built-in strength and rigidity that mean a high degree of maintained accuracy on the most exacting precision drilling. They will drill holes from .008" to $^{1}4^{\prime\prime}$ in diam. Available in 1, 2, 3, and 4 spindle models . . . speeds from 4,000 to 10,000 r.p.m. . . . all moving parts completely enclosed for maximum operating safety.

Send for illustrated bulletin.

THE SIGOURNEY TOOL CO. HARTFORD 6, CONN.



PRATT & WHITNE

Division Niles - Bement - Pond Co. . .

. . . West Hartford, Connecticut

PRECISION GAGES

More stress has been placed on the need for various kinds of precision gages since we became involved in war production than had been known before. The outstanding reason for this is the high value of having all parts going into planes, tanks, etc., fully interchangeable.

In a dozen badly damaged planes or tanks, there will still be a lot of parts in each that have suffered no damage. If those parts are fully interchangeable by reason of having been made to a high degree of accuracy, it is quite possible that by tearing them apart and salvaging

all good parts, half or more of the equipment can be reclaimed right on the ground.

Among the various items that must be closely checked, of course, is the threading of parts, and the gages that have been de-veloped for this purpose by some manufacturers allow of almost unhelievable accuracy. Threads are checked on the pitch line by one type of thread checker to one ten - thousandth, and the device has capacity up to 5" diameters.

Plug gages, of course, c o m e in for a great deal of consideration. In this connection, it is interesting to know that s o m e grinding wheel m a n u f a c turers have taken the matter of grinding wheels for plug gages very seriously. They are able to select exactly the right wheels from stock for any given gage job.

In addition, they offer to send their

engineers directly into the plant where plug gages are being made, to check up on the grinding conditions, and to see whether full advantage is being taken of the wheels being used.

It is, of course, obvious that a distinct saving in time is realized if boring cut-

It is, of course, obvious that a distinct saving in time is realized if boring cutters can be set accurately on the first try, rather than depending on the trial-and-error method. Did you know that tool setting gages for this purpose have been developed?

One such gage is in the form of a combination clamp and slide, the slide carrying a micrometer or a dial indicator.

FELL PRECISION LEVEL



A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005* per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sizes—
\$\sqrt{5\sqrt{2}}\cdot 212* \sqrt{2}\sqrt{2}\sqrt{2}\cdot 3.00* \sqrt{2}\sqrt{2}\cdot 3.00* \sqrt{2}\sqrt{2}\sqrt{2}\cdot 3.00* \sqrt{2}\sqrt{2}\sqrt{2}\cdot 3.00* \sqrt{2}\sq

Write TODAY for bulletin giving full details.

Wm. B. FELL COMPANY

The CRITERION Carbide Tool Grinder

GREATER PRODUCTION CAPACITY

Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Bull for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third H.P. balanced precision bearing motor com-

pletely enclosed and radially mounted in rubber. Standard equipment. One 60 and one 100 grit 7" dia steel backed silicon carbide wheels. Ideal for metal banded or Resincial bonded diamond wheels.



Order from your dealer or write direct. Request literature. No obligation.



SHORT-CUT TO IRREGULAR SHAPES

THE HEINRICH HEAVY-DUTY HANDNIB

A Hand Operated Combination Nibbling, Shearing, Punching and Rod Cutting Machine. (Withswivelbase)

Capacity: Nibbling and Shearing 3/16" flat stock . . . Punching Holes up to ½" in ½" sheets . . . Rod Cutting 3/16", ¼", 5/16" and ¾" round bars. Ask for Descriptive Folder.



THE NATIONAL MACHINE TOOL CO.



General Purpose. Holds the edge over H.S.S.

> DELLOY #6 or #9 Cast Non-Ferr. Alloy.

DELLOY DC-7

Carbide. For Iron, Non-ferrous Metals. Plastics, etc.

DELLOY DS-8 Carbide, For Steel,

Here are the tools, bits and tips that stay sharper, longer . . . that mean fewer grinds and increased production on all turning, boring and facing operations. Uniform density and hardness guaranteed through rigid metallurgical and laboratory control. Complete grinding department assures quick delivery of special tools to your specifications. Send prints.

Free Test Tools Promptly on Request

"A Bit Better"

256 W. HUNTINGDON ST., PHILADELPHIA 33, PA. SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

PAPER SALVAGE

American industry is doing a job of wastepaper salvage about equal to what households are accomplishing, the WPB said recently. WPB estimated that of all wastepaper salvaged, excluding that obtained from Government agencies, approximately 50% is turned in by manufacturing concerns, business houses, stores and other commercial organizations.

Total wastepaper receipts at the mills last year totaled 6,060,000 tons. The goal for 1944 is 8,000,000 tons.

Industry salvaged 2,750,000 tons of wastepaper in 1943. The paper was obtained

The industrial wastepaper salvage work is conducted by volunteer committees. These groups have in their membership a representative of each main type of local industry and business, who is responsible for enlisting the support of all business con-cerns in his line. The individual plants appoint a plant salvage man-

from a wide va-riety of sources, ranging from printing and other plants whose raw material is paper,

to collections of newspapers

trains at the end of their runs. The program is directed by the Industrial Salvage

Branch, whose field

In addition, about 8,000 leading indus-

trialists and busi-nessmen in 800 in-

dustrial communities are reaching

75,000 of the larger

plants, with many offices and other

establishments as

additional partici-

pants in the effort.

contacts thousands of plants.

magazines

force

and

from

ager, who works with superintendents, foremen, office managers and others.

Like housewives and other folks, our business organizations have had to be educated to salvage wastepaper. However, once convinced of the urgent need, and in a sense prompted by the spectre of curtailment in their own supply, American industry is doing a magnificent job of salvaging wastepaper.

Some plants are conducting contests among employees. An Eastern businessform producer offered a \$25 War Bond to the person bringing most paper during

one month.



YOU HARDEN IT



"HARDSTEEL" DRILLS SPEED THE DIES FOR THE WINGS OF TOMORROW...

"HARDSTEEL" drills in thousands of plants are speeding die production—drilling hardened dies when last minute engineering changes call for holes in new locations or for additional holes—saving both critical materials and countless man-hours.

For fast, accurate drilling of steel hardened by any process to Rockwell "C" 40 or harder, there is only one answer —"HARDSTEEL," the three-cornered drill made from a special

alloy material that can be reground quickly on any wheel.

"HARDSTEEL" is also available in reamers, tool bits and special tools. These tools are setting excellent production records on tough, hard-cutting steels and abrasive non-ferrous alloys.

Complete data on "HARDSTEEL" tools is contained in the "HARDSTEEL" Operator's Manual, together with instructions for using and many illustrations showing both parts recovery and production operations. Copy free on request.

BLACK DRILL COMPANY
1400 EAST 222nd STREET . CLEVELAND 17, OHIO



"HARDSTEEL"

DRILLS . REAMERS . TOOL BITS . SPECIAL TOOLS

SCHRILLO COUNTERSINK



This recent development of the Schrillo Aero Tool Engineering Co., 8715 Melrose Ave., Los Angeles 46, Cal. is in harmony with the present demands of the aircraft industry. The unit has several notable features:—adjustments in increments of .001" without use of any tool; a positive lock, preventing loss of adjustments when in use; a self contained knockout pin facilitating removal of taper shank cutters; ball thrust bearing; self-lubricating long life bearing; hardened and ground alloy steel shaft, etc. A factory rebuilding service is available at nominal cost.

GROUND FLUTE REAMERS

A line of small high speed reamers with ground flutes is offered by Lavallee and Ide, Inc., Chicopee, Mass. The makers point out these reamers are designed primarily to provide accuracy and smoother surface finish. Secondarily, but also important, they have a longer useful life.

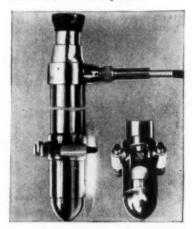
The reamers are produced from centerless ground high speed steel stock. Flutes are ground in after the hardening operation with accurate equipment developed especially for this work. As a final step, the reamers are thoroly lapped. It is claimed this process eliminates distortion of the flute structure which may occur in heat treating common diameter milledflute reamers. Keener cutting edges are provided because the flutes are ground on both faces, The line includes straight shank reamers in sizes from 1/16" up to and including 1/4". A new bulletin gives full details.

ILLUMINATED BORE MICROSCOPE

A line of unusually compact and effective bore inspection microscopes has been developed by the Lenox Instrument Co., 3010 Chancellor St., Philadelphia, 3, Pa.

Lenox Borescopes (2-3 Power) are widely used in the inspection of gun barrels, hollow shafts, tubes, well drill pipes, and hundreds of other industrial applications.

The Lenox Bore Microscope (50 power) illustrated is used in the inspection of engine cylinders plated by the Van de Horst Porous Chrome process.



Recommendations on special Borescopes inspection equipment will be made by this firm, without obligation. In writing give inside diameter and length of hole to be explored.

LARCO DIAMOND TOOLS

An interesting, loose leaf bulletin has been issued by the Larco Diamond Tool Co., 551-5th Ave., New York, 17, N. Y. Copy is made up in the form of 18 pages of questions and answers pertaining to the construction and use of diamond wheels. A considerable amount of useful information is given about proper operation and care.

Several pages of drawings and specifications are given, together with data on small periphery wheels, small rotary

tools, saw blades, hones, etc.



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PROTECT blueprints, work orders and job tickets from dirty hands, grease or grime . . .

Transparent Envelopes eliminate extra prints or tickets and soon pay for themselves in shop memoranda and mistakes they save. Durable and non-inflammable, they keep costly charts clean and readable throughout the job. Sizes and styles to fit your needs. Write for more information.

ansparent SHADE CO. 111 to BROADWAY



For handling stock of various widths, at speeds of 10 to 60³ per min. Portable. Compact. Fits into floor space 17x36⁸. Machine shown equipped with Littell Automatic Centering Reel.

Control arm starts and stops motor and regulates loop of stock between feed and press. Either five or seven straightener rolls may be used. 34 h. p., 1725 r. p. m., 60 cycle, 220 or 40-volt motor.

Other Littell products include Automatic Centering

Reels, various other types of Feeds, Scrap Cutters an Winders, Pres-Vac Safety Feeders, REQUEST Mechanical Pickers, etc. BULLETINS

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AIR OUTLET



Sizes 1/2" to 4" Pipe

Literature and Prices on request.

GUARANTEED NO ABSORBENTS - NO CHEMICALS

JAS. A. MURPHY & CO. HAMILTON, OHIO



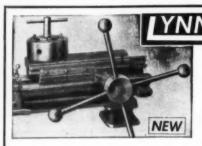
DIAMOND CALME

Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer. Our 45 years in this field merits your confidence.

CME DIAMOND TOOL CO. 15 MAIDEN LANE, NEW YORK, N. Y.





HEAVY DUTY, Self-Indexing

CONVERSION

BED TURRETS

MULTIPLY THE CAPACITY of Your ENGINE LATHES

Self-Indexing Bed Turrets, Tool Post Turrets and Cutoff Cross Slides are all essential equipment for fast and profitable production. LYNN manufactures a complete line of these machine tools: Bed Turrets for all makes and sizes of lathes from 9" to 28" swing; Tool Post Turrets for lathes from 12" to 30" swing; and Cutoff Cross Slides. Im-

mediate shipment from stock. Distributed nationally through jobbers.

At right, just a few of the many things that machine shops all over the world are making every day, on production basis—on ordinary lathes, converted with LYNN equipment. What is your problem? Perhaps we can help you.

Write for complete information

LYNN MFG. CO. • 220 Elroy St., Minneapolis 8, Minn.

These are the Present STANDARD SHAPES of CARBURS

INDUSTRY'S FIRST CEMENTED-CARBIDE ROTARY FILES

ACH of the tools illustrated is available in either four or five sizes—
providing a range that meets almost any production requirement
for deburring, filing or cutting. In addition to these, special shapes
are being produced to meet the specific needs of many customers.

Since Carburs were first introduced, a number of performance reports have been received from the plants where they have been in constant use. These reports prove that these rotary files—which have teeth ground from the solid cemented-carbide—are providing up to 100 times greater life than high speed steel files. They are greatly reducing deburring, filing or cutting time per part because of the higher speeds at which they can be run and the less frequent need for replacement. Another important feature noted is that tool sharpening is reduced in proportion to the life of the tool.

You, too, will recognize these and other advantages once you have used Carburs in your production. Prompt delivery on all standard shapes and sizes can now be promised. Let us send you full information.

LINCOLN PARK-WHERE

THE "Impossible"
IN PRECISION IS
ACHIEVED



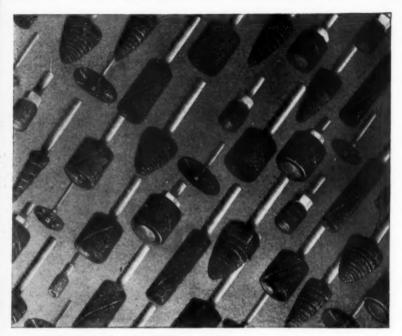


INCOLN PARK INDUSTRIES, INC.

Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

1731 FERRIS AVENUE

LINCOLN PARK 25. MICHIGA



PICTURE THESE AT 20,000 r.p.m.

You can easily sense what these readyto-use METALITE Cloth Gadgets will do on the business end of your high speed tools compared to a strip around a workman's finger or held loosely in his hand.

At speeds up to 20,000 r.p.m., isn't it obvious that they will do in seconds what now takes minutes by old-fashioned methods?

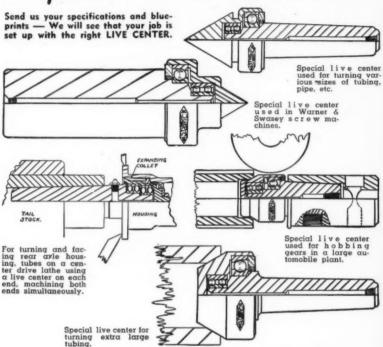
For burring, putting on radii, getting into all sorts of odd shaped "difficultto-get-at" places and for many other bothersome, time-consuming operations, METALITE GADGETS will save time and money and contribute greatly to smoother, better production

But, from the hundreds of sizes, shapes and grits, don't try to pick the one you think will do the job. We'll do better than that for you. A Field Engineer will tell you the best one for each specific operation and demonstrate on the toughest jobs you dig up for him. Simply call our nearest branch.

Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, High Point, Indianapolis, Los Angeles, New York, Philadelphia, St. Louis, San Francisco, Tacoma.

BEHR-MANNING (DIVISION OF NORTON COMPANY) TROY, N. Y.

Special Live Centers



Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action . . . that compensates for expansion due to heat, shock and excessive thrust loads — reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience . . . standard shanks with Morse taper carried in stock — prompt deliveries on high priorities.

TOOL COMPANY 5224 THIRD AVE. DETROIT MICH.

PROMPT DELIVERIES

HIGH SPEED END MILLS

DOUBLE END



Two and Four Flutes

Dia. of Mill	Diameter of Shank	Length of Flute	Overall Length	Net Price
1/8	3/8	3/8	3	2.20
5/32	3/8	3/8	3	2.20
3/16	3/8	1/2	3	2.20
7/32	3/8	5/8	3 1/8	2.20
1/4	3/8	5/8	3 1/8	2.20
9/32	3/8	3/4	3 1/8	2.20
5/16	3/8	3/4	3 1/8	2.20
11/32	3/8	3/4	3 1/4	2.20
3/8	3/8	3/4	3 1/4	2.20
7/16	1/2	1	4 1/4	2.80
1/2	1/2	1	4 1/4	2.80
5/8	5/8	1 3/8	5	3.44
3/4	3/4	1 5/8	5 5/8	4.20
1	1	1 3/4	6 1/4	5.40

SINGLE END

Two and Four Flutes

Dia. of Mill	Dia. of Shank	Length of Flutes		Overall Length		Net Price
1/8	3/8		3/8	2	5/16	1.40
3/16	3/8		1/2	2	3/8	1.40
1/4	3/8		5/8	2	1/2	1.40
5/16	3/8		3/4	2	1/2	1.40
3/8	3/8		3/4	2	1/2	1.40
7/16	1/2	1		2	1/16	1.76
1/2	1/2	1	1/4	3	1/4	1.88
5/8	5/8	1	5/8	3	3/4	2.40
3/4	3/4	1	5/8	3	3/4	2.52

LONG SINGLE END MILLS

Four Fluted

Dia. of Mill	Dia. of Shank		Length f Flutes		Overall Length	Net Price
1/4	3/8	1	1/4	3	1/8	1.68
5/16	3/8	1	3/8	3	1/8	1.68
3/8	3/8	1	1/2	3	1/4	1.68
7/16	1/2	1	3/4	3	3/4	2.08
1/2	1/2	2		4		2.16
5/8	5/8	2	1/2	4	5/8	2.76
3/4	3/4	3		5	1/2	3.44

VICTOR MACHINERY EXCHANGE, INC.

251 Centre Street

New York, N. Y.





Ask a Campbell Engineer to suggest cutting procedure and figure costs for your cutting . . .

CAMPBELL manufactures a complete range—in fact, the only complete range—of machines for abrasive cutting. 8 types, 19 models and countless variations developed to meet the jobs of cutting steels, annealed and unannealed; non-ferrous metals, plastics, glass and ceramics—solid bar, tubular and flat stock.

One corporation alone has found CAMPBELLS so efficient that they now use 120 CAMPBELL CUTTING MACHINES.

There is no reason why you should not call on this wide experience of CAMPBELIS and ask them what cutting procedure they would recommend for your plant—what the cost per piece would be. It doesn't put you under any obligation to do this but be sure to state materials you cut, shapes, lengths before cutting, lengths of cut-off pieces and production desired per hour.



ANDREW C. CAMPBELL DIVISION · Bridgeport, Connecticut

ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

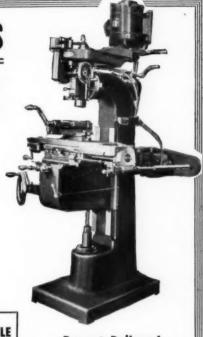
AMERICAN CHAIN & CABLE COMPANY, Inc.

INDEX MILLS

Now Available With RODS & INDICATORS

WE are pleased to announce a rod and indicator set available for installation on Index Mills, either new at the factory, or used machines already in the field. Set consists of two indicators graduated in .0001", two micrometer heads graduated in .0001", necessary precision rods for locating in an area 8"x16" and troughs for holding rods cross and longitudinal.

This makes it possible for you to obtain, at an astonishingly low price, a precision locator as well as a vertical mill which has already proven its merits in the tool room and production line. Rod and Indicator sets available for other machines also.



Prompt Delivery!

. . . On receipt of order and proper priority certificate.

12" TOOL ROOM ROTARY TABLE Mfd. by Index Machine & Tool Co.



A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only. Write to Factory Sales and Distributing Agents for complete information.

BLANK & BUXTON MACHINERY CO.

3100 E. MICHIGAN AVE. JACKSON, MICHIGAN

Rickert Shafer

Model "T" Die Head for Taper Threading



- 1. Mechanically correct way to cut taper threads.
- Taper controlled exactly by profiles on outside.
- 3. Thread length controlled by internal or external trip.
- Leaves no chaser marks on work when Die Head releases (an impartant feature on aircraft threads).
- 5. Longer chaser life.

Rickert-Shafer co · erie, pa.

IN HEADS . COLLAPSIBLE TAPS . BORING HEAD!



RECENT expansion of our manufacturing facilities has enabled us to increase our production of Thread Ring Gages to such an extent that we are now in a position to supply practically all standard sizes directly from stock.

When an emergency arises and you discover a sudden need for certain sizes, wire your order to Cadillac and your requirements will be speedily met. In fact, unless our stocks of a particular size have been temporarily depleted by similar rush orders from others, shipment will be made the very day your order is received.

The same applies to Standard Thread Plug Gages. With thousands on hand, ready to be packed and shipped, we can have them on their way to you immediately — by air express from the nearby Detroit airport, if so requested.

CADILLAC

Thread Ring

GAGES

ALL STANDARD

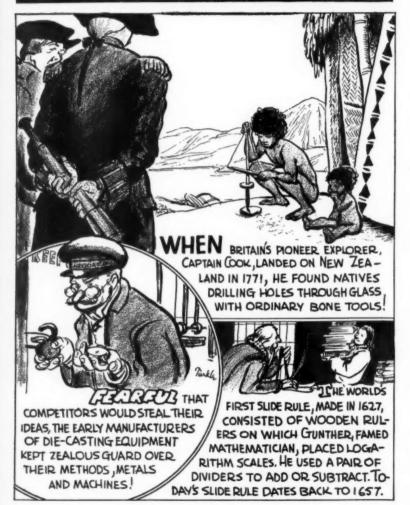
SIZES

National Coarse National Fine 0-80 to 11/2-6



CADILLAC GAGE COMPANY, Deroit

Mechanics Through the Ages



GRIND THEM RIGHT with the COVEL No. 12



Straight Form
Tool—Tool is held in
Covel Style G vise,
360° swivel base,
tilting 90°.

Universal Cutter and Tool Grinder

✓ Face Milling Cutter — is mounted on
the arbor and placed
in spindle, ground
with cup grinding
wheel. Hook tooth
rest for accuracy.

■ Spiral Milling Cutter — ground with cup' grinding wheel. Adjustable curved lip rest mounted on head allows cutter to rotate without affecting grinding accuracy.

■ Spiral End Mill— Top table swings 180°, allowing 3" more capacity between grinding wheel and universal face mill grinding attachment.

■ Taper Reamers — Top table adjusted for correct taper. Has hand table lever and micrometer tooth rest.



 Triple requirements are imposed on cutter and tool grinders in wartime. The production line demands sharper tools that will hold up • longer. To save irreplaceable tool steel, toolroom managers insist that they be ground to finer tolerances. Superintendents want machines simple in operation for more rapid employee training.

The Covel No. 12 cutter and tool grinder was built to meet these conditions. The three-speed grinding wheel is driven by a V-belt accessible for quick change. Spring loaded precision ball bearings in the cartridge type spindle automatically take up expansion and wear, assuring accuracy. Safety factors are in-built to protect your operators.



 Write for the full story of the Covel No. 12 Universal Cutter and Tool Grinder, in Bulletin MT-54.



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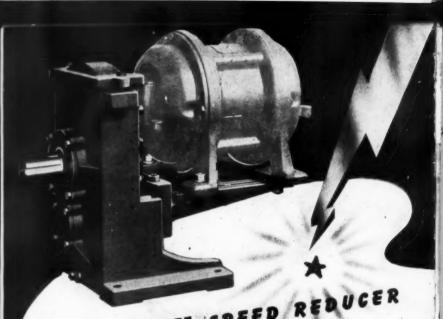
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